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SUMMARY

An investigation has been made in the Langley full-scale (30- by 60-foot) tunnel to determine the longitudinal aerodynamic characteristics of a large-scale semispan V/STOL tilt-wing configuration with a single propeller which was tested for both modes of rotation. The model had a half-fuselage on which loads were measured separately. The wing had a chord-to-propeller-diameter ratio of 0.5, a 40-percent-chord single-slotted flap, an aspect ratio of 4.88 (2.44 for the semispan), a taper ratio of 1.0, and an NACA 4415 airfoil section.

The data have not been analyzed in detail, but have been examined to observe the predominant trends. It was found that the direction of propeller rotation had a very significant effect on the lift and descent capability (as determined from drag-lift ratios attainable without stalling of any part of the wing within the propeller slipstream) and that up-at-the-tip rotation gave the more favorable results. The use of a trailing-edge flap was also very effective in increasing the descent capability. The use of leading-edge flow-control devices was very effective in increasing the descent capability and lift for the case of down-at-the-tip propeller rotation where the characteristics without such devices were poor, but was much less effective for the case of up-at-the-tip propeller rotation where reasonably favorable results were achieved without leading-edge devices. For the most favorable combination of the configuration variables, descent angles of nearly 29° were achieved over the entire test range of power conditions.

INTRODUCTION

Most of the aerodynamic research that has been done on the tilt-wing propeller-driven V/STOL configuration in the past has been of an exploratory character and has been done with small-scale models. The interest in this type of airplane has now become so substantial, however, that there is need for large-scale systematic aerodynamic design data for this concept. A program has therefore been inaugurated at the Langley Research Center to provide such information by means of tests of a large-scale semispan tilt-wing-and-propeller model. The

results for the wing alone have been published in references 1 to 4. The results for the wing with a fuselage are presented in references 5 and 6 for the cases of a double-slotted and a single-slotted flap, respectively.

The results of the present tests are for the configuration of reference 6 (single-slotted flap), but with the propeller thrust axis located 19 percent of the wing chord below the chord plane. The model had a single propeller on the semispan wing, a chord-diameter ratio of 0.5, a single-slotted flap, a leading-edge slat, and fences. The investigation covered a range of angle of attack from 5° to 85° and a range of thrust coefficients (based on slipstream) from 0.30 to 0.90. Included in the investigation were tests with both directions of propeller rotation. The lift, drag, and pitching moments of the model were measured over the range of test conditions. The flow was observed by means of tufts on the upper surface of the wing. The results of this investigation are presented without detailed analysis in order to expedite their dissemination to industry and the military services.

SYMBOLS

The positive sense of forces, moments, and angles is shown in figure 1. The pitching-moment coefficients are presented with reference to the wing quarter-chord line. The coefficients are based on the dynamic pressure in the propeller slipstream. Conventional lift, drag, and pitching-moment coefficients based on the free-stream dynamic pressure can be obtained by dividing the slipstream coefficients by $1 - C_{T,s}$; for example, $C_L = C_{L,s}/(1 - C_{T,s})$. The thrust coefficient C_T' may be found from the equation $C_T' = \left[C_{T,s}(A/S)\right]/(1 - C_{T,s})$.

Measurements for this investigation were made in the U.S. Customary System of Units. Equivalent values are indicated herein in the International System (SI) in the interest of promoting the use of this system in future NASA reports. Factors relating the two systems of units used in this paper may be found in the appendix.

The coefficients and symbols used in this paper are defined as follows:

A	total propeller disk area, ft^2 ($meters^2$)
b	propeller blade chord, ft (meters); also wing span, ft (meters)
$C_{D,s}$	drag coefficient based on slipstream, D/q_sS
C_L	lift coefficient based on free airstream, L/qS
$C_{L,s}$	lift coefficient based on slipstream, L/q_sS
$C_{L,s(fus)}$	fuselage lift coefficient based on slipstream
$C_{m,s}$	pitching-moment coefficient based on slipstream, M_Y/q_sSc

$C_{T,s}$	thrust coefficient based on slipstream, $\frac{T}{q_s(\pi D^2/4)}$
C_T'	thrust coefficient based on free airstream, T/qS
c	wing chord, ft (meters)
c_f	flap chord, ft (meters)
D	propeller diameter, ft (meters); also, total model drag, lbf (newtons)
h	thickness of propeller blade, ft (meters)
L	total model lift, lbf (newtons)
M_Y	pitching moment, lbf-ft (newton-meters)
q	free-stream dynamic pressure, $\frac{\rho V^2}{2}$, $\frac{\text{lbf}}{\text{ft}^2}$ $\left(\frac{\text{newtons}}{\text{meter}^2}\right)$
q_s	slipstream dynamic pressure, $q + \frac{T}{\pi D^2/4}$
R	radius of propeller blade, 2.83 ft (0.86 meter)
r	radius to element on propeller blade, ft (meters)
S	area of semispan wing, 19.6 ft^2 (1.82 meters^2)
T	propeller thrust, lbf (newtons)
V	free-stream velocity, ft/sec (meters/sec)
x	longitudinal distance, ft (meters)
y_l	lower-surface ordinate, ft (meters)
y_u	upper-surface ordinate, ft (meters)
z	vertical distance, ft (meters)
α	angle of attack, deg
γ	flight-path angle (positive for climb), deg
δ_f	flap deflection, deg
ρ	mass density of air, $\frac{\text{slugs}}{\text{ft}^3}$ $\left(\frac{\text{kilograms}}{\text{meter}^3}\right)$

MODEL

The model used in this investigation was a semispan model which would represent the left panel of the full-span wing and the left half of the fuselage. The principal dimensions of the wing are given in figure 2. A three-view drawing of the fuselage-wing combination is given in figure 3(a) and a cross-sectional view of the fuselage is shown in figure 3(b). The propeller-blade characteristics are given in figure 4, and a photograph showing the model mounted in the Langley full-scale tunnel is presented in figure 5.

The wing was mounted on the balance system in the tunnel so that the lift and drag of the wing were read directly about the wind axis. The wing pivoted about its quarter-chord point and its pitching moments were measured about this point, and are referred to this point in the data presentation as indicated by figure 1.

When the half-fuselage was added to the existing wing model it was necessary to cause the fuselage to move relative to the wing quarter-chord point in order to avoid structural conflict between the wing and the fuselage. The fuselage was consequently mounted on a parallel arm arrangement so that it moved as the wing angle of attack was varied. It moved as though it were pivoted at the 58-percent wing-chord station on the wing lower surface. The illustration in figure 3(a) shows the relationship of the wing to the fuselage at a given angle of the wing. The fuselage was not actually attached to the wing, however, and its forces did not register on the tunnel balance. Instead the load on the fuselage (lift only) was measured on separate strain-gage balances. At all times the fuselage remained at zero angle of attack relative to the airstream.

The basic structure of the wing consists of a heavy box-beam spar to which a power train to drive the propellers through spanwise shafting is attached, and around which various airfoil contours can be fitted. The propeller location was such that the propeller tip extended out to the wing tip. In the present investigation both directions of propeller rotation were tested. The propeller thrust was measured by a strain-gage balance which was a part of the propeller shaft. The output was fed through sliprings to an indicating instrument. The required values of thrust for each value of $C_{T,s}$ were set by changing the speed of the drive motor. The blade angle at the 0.75R station of the propeller was held constant at 17° throughout the investigation. The propeller was located 0.19c below the wing chord plane and 0.65c ahead of the wing quarter-chord line as shown in figure 2(a). The thrust line was parallel to the wing chord plane.

The airfoil used for the wing was the NACA 4415 section with a 2.83 ft (0.86 m) chord. This chord length gave a ratio of wing chord to propeller diameter of 0.5. The reference area of the wing based on a semispan of 6.92 ft (2.11 m) was 19.6 ft^2 (1.82 m^2) and did not include the area of the tip fairing.

The model had a 0.40c single-slotted trailing-edge flap. The ordinates and the positions for the various deflections are given in figure 2(c). The flap is illustrated in figure 2(c) for the 40° deflection.

The leading-edge slat shown in figure 2(b) was investigated in combination with the flap on this model. A slat deflection of 30° was used on all of the wing except that part of the wing which extended across the top of the fuselage, where the high position was used so that low angles of attack ($\alpha = 5°$) could be obtained without the slat touching the fuselage. Otherwise the minimum angle of attack would have been about 15°.

Fences having a height of 0.20c and extending from 0.13c on the lower surface around the leading edge to about 0.75c on the upper surface were installed at two spanwise locations on the wing (see fig. 2(d)) in an attempt to confine the stall inboard of the propeller slipstream. When tests were made with fences on, both fences were installed.

TESTS

The tests were made for a range of single-slotted-flap deflections and with and without a leading-edge slat and fences. The specific configurations tested, together with a list of tables and figures in which data for each may be found, are given in the following table:

Direction of rotation	Configuration	Flap deflection, δ_f, deg	Table	Figure	
				Aerodynamic data	Fuselage lift coefficients
Up-at-tip	Basic leading edge	0	1	6	37
		20	2	7	37
		40	3	8	37
		60	4	9	37
	Basic leading edge with fences on	20	5	10	38
		40	6	11	38
		60	7	12	38
	Inboard slat	20	8	13	39
		40	9	14	39
		60	10	15	39
	Inboard slat with fences on	20	11	16	40
		40	12	17	40
		60	13	18	40

Direction of rotation	Configuration	Flap deflection, δ_f, deg	Table	Figure	
				Aerodynamic data	Fuselage lift coefficients
Up-at-tip	Full-span slat with fences on	20	14	19	41
		40	15	20	41
		60	16	21	41
	Outboard slat with fences on	20	17	22	42
		40	18	23	42
		60	19	24	42
Down-at-tip	Basic leading edge	0	20	25	43
		20	21	26	43
		40	22	27	43
		60	23	28	43
	Basic leading edge with fences on	40	24	29	44
		60	25	30	44
	Inboard slat	20	26	31	45
		40	27	32	45
		60	28	33	45
	Inboard slat with fences on	20	29	34	46
		40	30	35	46
		60	31	36	46

The tests were made over a range of thrust coefficients from 0.30 to 0.90. For any given test the thrust coefficient was held constant over the angle-of-attack range by adjusting the propeller speed to give the required thrust at each angle of attack. The angle-of-attack range was from 5° to that required to stall the wing or to develop a drag-lift ratio of about 0.3, whichever was lower. The test Reynolds number, based on the wing chord length and the velocity of the propeller slipstream, was about 2.38×10^6.

No tunnel-wall corrections have been applied to the data since surveys and analysis had indicated that there would be no significant correction, as explained in reference 1.

DISCUSSION

The data presented have not been analyzed in detail, but have been examined for general trends. One very general observation was that the force-test data could not be used as an indication of the occurrence or extent of wing stalling. The tuft-test results show that the onset of stalling over significant areas of the part of the wing within the propeller slipstream frequently occurs

considerably below or above the angle of attack for maximum lift coefficient. The data were examined, in particular, to determine the effect of the various test variables on descent capability - the descent capability being determined from the D/L values attainable prior to indication by the tufts of stalling of any part of the wing within the propeller slipstream.

Effect of Direction of Propeller Rotation

The force- and tuft-test data show that the up-at-the-tip direction of rotation consistently gave higher maximum lift and higher descent capability. In general, the tuft pictures show that rough flow and stalling (as indicated by areas on the wing where the tufts are swirling violently or have become very limp and are pointed in random directions) occurred at an angle of attack as much as 25° to 30° lower with down-at-the-tip rotation than with up-at-the-tip rotation for the higher thrust coefficient ($C_{T,s} = 0.90$). Down-at-the-tip propeller rotation consistently causes stalling (of the part of the wing in the slipstream) to start inboard of the nacelle, that is, behind the up-going blades. When stall occurred on the wing for the up-at-the-tip mode of rotation it occurred only outboard of the nacelle.

Effect of Leading-Edge Slat

Comparison of figures 7 to 9 with 13 to 15 for up-at-the-tip rotation and figures 26 to 28 with 31 to 33 for down-at-the-tip rotation gives the effect of the inboard section of the leading-edge slat. The force and tuft tests show that for both directions of propeller rotation the slat was beneficial in extending maximum lift to higher angles of attack (particularly for the lower thrust coefficients, $C_{T,s} = 0.30$ and 0.60), although only for down-at-the-tip rotation did the slat give any appreciable increase in descent capability.

The effect of the full-span slat (figs. 19 to 21) was determined only for up-at-the-tip rotation. By comparison with the inboard-slat results (figs. 16 to 18), the tuft tests show that the outboard section of the slat reduced the tip stalling and produced an appreciable increase in both $C_{L,s}$ and descent capability, which for the 60° flap deflection was nearly 23° for the range of thrust coefficients tested.

Effect of Fences

The effect of fences can be ascertained for both directions of propeller rotation for the model with the basic leading edge and with the leading-edge slat installed. Compare figures 7 to 18 for up-at-the-tip rotation and figures 26 to 36 for down-at-the-tip rotation. These results, as in previous investigations with the propeller thrust line above the wing chord, show that the fences were most effective for the case of down-at-the-tip mode of propeller rotation. In this case the wing has a tendency to stall inboard of the nacelle because of the rotation of the propeller slipstream, and the fences are effective in preventing the center-section stall from spreading and prematurely

triggering the stalling of the section of the wing in the propeller slipstream inboard of the nacelle. Specifically, the results of the present tests show that the fences with up-at-the-tip rotation caused some slight increase in lift and descent capability, the most improvement being shown for the 20° flap deflection; but for the case of down-at-the-tip propeller rotation, the fences gave significantly more descent capability over the range of flap deflection, particularly for the higher thrust coefficients.

Effect of Flap Deflection

There was a progressive increase in maximum lift coefficient and descent capability as flap deflection was increased. The greatest increment occurred with the deflection from 0° to 20° for either mode of propeller rotation, but it must be pointed out that for down-at-the-tip rotation the model with $\delta_f = 0$ had a negative descent capability ($\gamma = -22°$). (See fig. 25.) With 20° of flap deflection (fig. 26), there was a change of approximately 21° in the positive direction, but still not enough to produce any noticeable descent capability. With up-at-the-tip rotation, increasing flap deflection from 0° to 20° increased the descent angle from about 9° to about 20°. With this direction of rotation, full-span slat, and fences, a descent capability of nearly 29° was obtained with 60° of flap deflection.

Fuselage Lift

The fuselage lifts plotted in figures 37 to 46 are presented in the same units as the wing lift coefficients. In general, the maximum fuselage lift occurred at about the angle of attack for maximum lift. This trend was true for the various flap deflections, and for both directions of propeller rotation. The inboard slat and fences had no appreciable effect on the fuselage loading.

CONCLUSIONS

An experimental investigation has been made to determine the longitudinal aerodynamic characteristics of a large-scale semispan V/STOL tilt-wing configuration with a single propeller which was tested for both modes of rotation. The model had a half-fuselage on which loads were measured separately. The following conclusions were drawn from the results of the investigation:

1. The direction of propeller rotation had a significant effect on the lift and descent capability attainable for most of the configurations tested, with the up-at-the-tip mode of propeller rotation giving the more favorable results.

2. Leading-edge stall-control devices were very effective in improving the descent capability for the down-at-the-tip mode of propeller rotation. With leading-edge slats and fences, almost as favorable results could be achieved with this mode of propeller rotation as with up-at-the-tip rotation.

3. The use of flaps was very effective in increasing the lift and the descent capability for either mode of rotation. With 40° or 60° flap deflection and with the most favorable combination of flow-control devices tested, descent angles of nearly 29° were achieved for the entire test range of power conditions.

Langley Research Center,
National Aeronautics and Space Administration,
Langley Station, Hampton, Va., August 30, 1966,
721-01-00-11-23.

APPENDIX

CONVERSION FACTORS - U.S. CUSTOMARY UNITS TO SI UNITS

The International System of Units (SI) was adopted by the Eleventh General Conference on Weights and Measures, Paris, October 1960. (See ref. 7.) The following conversion factors are included in this report for convenience:

Physical quantity	U.S. Customary Unit	Conversion factor (*)	SI Unit
Area	ft^2	0.0929	$meters^2$ (m^2)
Density	$slugs/ft^3$	515.38	$kilograms/meter^3$ (kg/m^3)
Force	lbf	4.448	newtons (N)
Length	in.	0.0254	meters (m)
	ft	0.3048	meters (m)
Moment	lbf-ft	1.356	newton-meters (N-m)
Pressure	lbf/ft^2	47.88	$newtons/meter^2$ (N/m^2)
Velocity	ft/sec	0.3048	meters/second (m/sec)

*Multiply value given in U.S. Customary Unit by conversion factor to obtain equivalent value in SI Unit.

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TABLE 1.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 0^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.234	-1.147	0.273	0.284	-1.004	0.243
10	.400	-1.108	.297	.465	-.964	.258
15	.567	-1.070	.310	.650	-.917	.276
20	.704	-.992	.315	.831	-.836	.294
25	.850	-.913	.319	.992	-.745	.293
30	.978	-.805	.315	1.115	-.613	.300
35	1.073	-.698	.319	1.200	-.479	.293
40	1.164	-.577	.321	1.302	-.337	.296
45	1.232	-.457	.320	1.374	-.199	.293
50	1.293	-.327	.315	1.436	-.052	.294
55	1.332	-.189	.311	1.464	.094	.289
60	1.342	-.063	.309	1.471	.226	.290
65	1.367	.062	.310	1.467	.360	.298
70	1.360	.185	.306	1.424	.461	.309
75	1.340	.306	.313	1.366	.534	.319
80	1.332	.420	.330			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.324	-0.731	0.163	0.395	-0.359	0.063
10	.542	-.685	.195	.643	-.306	.100
15	.759	-.621	.214	.908	-.239	.133
20	.984	-.536	.233	1.148	-.137	.138
25	1.174	-.413	.236	1.333	-.013	.155
30	1.303	-.274	.228	1.404	.141	.102
35	1.395	-.120	.224	1.308	.303	.050
40	1.427	.062	.191	1.357	.473	.049
45	1.469	.230	.185	1.322	.585	.039
50	1.475	.392	.176			
55	1.435	.516	.165			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.013	0.011	-0.005	-0.025
10	.012	.014	.002	-.023
15	.001	.021	.014	-.015
20	.020	.028	.023	.006
25	.023	.034	.032	.025
30	.030	.049	.054	.040
35	.039	.064	.074	.055
40	.047	.073	.090	.061
45	.055	.079	.092	.068
50	.055	.082	.098	
55	.058	.087	.098	
60	.054	.086		
65	.050	.087		
70	.046	.086		
75	.041	.073		
80	.047			

TABLE 2.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.517	-1.048	0.141	0.609	-0.893	0.083
10	.677	-.981	.150	.808	-.828	.087
15	.837	-.910	.158	1.007	-.729	.087
20	.991	-.811	.149	1.181	-.611	.083
25	1.111	-.696	.147	1.324	-.463	.079
30	1.225	-.563	.140	1.455	-.313	.080
35	1.324	-.419	.133	1.520	-.159	.075
40	1.384	-.274	.130	1.565	.004	.075
45	1.429	-.137	.131	1.597	.146	.074
50	1.447	.004	.132	1.591	.275	.085
55	1.457	.119	.133	1.545	.372	.108
60	1.449	.255	.153	1.510	.473	.127
65	1.419	.351	.150	1.465	.577	.152
70	1.376	.435	.169	1.402	.635	.177
75	1.343	.508	.193	1.333	.680	.202
80	1.296	.581	.228	1.134	.641	.205
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.727	-0.610	0	0.876	-0.241	-0.127
10	.996	-.536	.006	1.180	-.141	-.115
15	1.256	-.407	-.001	1.524	-.006	-.117
20	1.486	-.268	-.018	1.797	.161	-.126
25	1.675	-.099	-.012	2.022	.331	-.136
30	1.733	.069	-.019	2.010	.520	-.144
35	1.762	.228	-.020	1.968	.669	-.155
40	1.766	.381	-.011	1.647	.771	-.165
45	1.735	.497	.007	1.489	.843	-.147
50	1.698	.610	.018			
55	1.665	.718	.042			
60	1.341	.737	.036			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.017	0.029	0.037	0.035
10	.011	.031	.048	.043
15	.009	.030	.057	.054
20	.009	.037	.074	.069
25	.012	.050	.083	.080
30	.020	.062	.098	.084
35	.029	.080	.106	.098
40	.037	.079	.113	.086
45	.032	.075	.114	.073
50	.031	.073	.111	
55	.029	.073	.102	
60	.027	.068	.075	
65	.022	.061		
70	.014	.054		
75	.012	.031		
80	.019	.006		

TABLE 3.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.710	-0.919	0.076	0.826	-0.767	0.019
10	.855	-.849	.074	1.019	-.676	.023
15	1.005	-.755	.075	1.199	-.555	.022
20	1.136	-.634	.069	1.380	-.411	.011
25	1.264	-.508	.068	1.509	-.252	.007
30	1.361	-.361	.057	1.606	-.093	.003
35	1.429	-.204	.054	1.622	.069	.002
40	1.469	-.061	.054	1.632	.214	.010
45	1.487	.069	.064	1.626	.333	.025
50	1.480	.198	.077	1.582	.416	.060
55	1.468	.315	.084	1.515	.484	.091
60	1.420	.395	.108	1.480	.601	.100
65	1.390	.456	.132	1.424	.677	.129
70	1.333	.513	.155	1.344	.697	.162
75	1.295	.558	.185	1.247	.731	.183
80	1.242	.618	.210	1.047	.634	.199
85	1.189	.658	.239			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.993	-0.472	-0.070	1.208	-0.075	-0.199
10	1.255	-.368	-.074	1.519	.041	-.192
15	1.494	-.229	-.084	1.812	.191	-.203
20	1.731	-.060	-.089	2.054	.379	-.214
25	1.841	.120	-.097	2.247	.568	-.214
30	1.838	.271	-.088	2.055	.717	-.185
35	1.842	.420	-.075	1.973	.836	-.191
40	1.783	.538	-.043	1.553	.821	-.149
45	1.717	.626	-.026	1.339	.852	-.150
50	1.664	.713	-.003			
55	1.496	.764	.020			
60	1.223	.731	.018			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0	0.023	0.061	0.067
10	-.007	.024	.064	.078
15	-.006	.026	.079	.092
20	-.002	.033	.093	.100
25	.004	.033	.102	.107
30	.009	.055	.113	.098
35	.013	.072	.114	.101
40	.013	.072	.107	.069
45	.011	.065	.104	.046
50	.012	.059	.098	
55	.012	.047	.092	
60	.005	.045	.055	
65	-.003	.045		
70	-.010	.037		
75	-.011	.015		
80	-.002	.006		
85	.009			

TABLE 4.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.880	-0.743	0.005	1.008	-0.582	-0.053
10	.983	-.668	.011	1.204	-.456	-.058
15	1.110	-.548	.015	1.380	-.322	-.057
20	1.256	-.412	.003	1.505	-.177	-.045
25	1.352	-.262	-.002	1.612	-.012	-.060
30	1.423	-.117	0	1.682	.156	-.065
35	1.466	.027	-.018	1.671	.289	-.053
40	1.476	.169	.003	1.604	.355	.004
45	1.478	.289	.011	1.558	.425	.030
50	1.467	.398	.038	1.481	.495	.048
55	1.418	.466	.078	1.440	.609	.068
60	1.371	.497	.094	1.394	.697	.088
65	1.316	.507	.133	1.333	.762	.108
70	1.265	.518	.169	1.265	.772	.159
75	1.221	.545	.194	1.010	.615	.176
80	1.177	.597	.228			
85	1.124	.616	.249			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.255	-0.268	-0.157	1.543	0.137	-0.338
10	1.499	-.149	-.159	1.774	.267	-.261
15	1.684	.015	-.148	2.024	.437	-.275
20	1.881	.196	-.161	2.269	.646	-.276
25	1.951	.377	-.158	2.284	.806	-.272
30	1.853	.473	-.117	1.954	.826	-.182
35	1.802	.564	-.071	1.845	.934	-.173
40	1.696	.641	-.054	1.357	.846	-.142
45	1.611	.705	-.020			
50	1.323	.704	-.008			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.018	0.019	0.081	0.106
10	-.014	.019	.083	.116
15	-.009	.020	.084	.126
20	-.007	.027	.089	.125
25	-.005	.035	.101	.118
30	-.004	,050	.102	.086
35	.002	.065	.102	.089
40	.004	.052	.088	.039
45	.006	.045	.083	
50	.004	.039	.051	
55	.003	.032		
60	-.005	.031		
65	-.016	.034		
70	-.022	.030		
75	-.025	.010		
80	-.023			
85	-.015			

TABLE 5.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.515	-1.039	0.137	0.604	-0.880	0.084
10	.674	-.969	.144	.805	-.811	.089
15	.832	-.895	.151	1.001	-.719	.086
20	.978	-.790	.148	1.179	-.592	.085
25	1.109	-.678	.149	1.341	-.449	.081
30	1.229	-.542	.139	1.468	-.287	.076
35	1.321	-.398	.124	1.550	-.118	.061
40	1.389	-.243	.120	1.616	.062	.050
45	1.435	-.095	.116	1.640	.208	.055
50	1.462	.045	.112	1.633	.345	.066
55	1.468	.184	.119	1.584	.448	.085
60	1.453	.292	.135	1.521	.498	.123
65	1.423	.391	.142	1.446	.566	.146
70	1.384	.475	.157	1.393	.640	.174
75	1.336	.542	.191	1.326	.683	.202
80	1.296	.620	.228	1.114	.633	.197
85	1.267	.640	.289			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.751	-0.625	0.002	0.870	-0.222	-0.129
10	.988	-.525	.006	1.194	-.130	-.111
15	1.258	-.408	.003	1.514	.003	-.127
20	1.493	-.267	-.004	1.822	.176	-.138
25	1.707	-.096	-.012	2.057	.364	-.147
30	1.821	.108	-.041	2.204	.590	-.173
35	1.890	.300	-.049	2.219	.784	-.192
40	1.923	.475	-.046	1.825	.868	-.178
45	1.892	.614	-.028			
50	1.865	.744	-.003			
55	1.796	.839	.027			
60	1.407	.797	.032			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.018	0.029	0.042	0.038
10	.013	.032	.055	.055
15	.008	.033	.066	.072
20	.007	.036	.079	.090
25	.011	.044	.092	.100
30	.019	.062	.111	.125
35	.025	.078	.136	.154
40	.029	.078	.140	.127
45	.028	.079	.134	
50	.025	.071	.125	
55	.016	.071	.109	
60	.014	.068	.062	
65	.012	.060		
70	-.002	.054		
75	-.015	.038		
80	-.021	.012		
85	-.049			

TABLE 6.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.699	-0.909	0.070	0.832	-0.762	0.015
10	.848	-.842	.076	1.011	-.667	.022
15	.993	-.742	.077	1.208	-.548	.019
20	1.124	-.618	.067	1.388	-.402	.008
25	1.256	-.493	.065	1.526	-.238	0
30	1.347	-.343	.056	1.622	-.062	-.014
35	1.425	-.188	.050	1.676	.111	-.022
40	1.470	-.034	.046	1.700	.274	-.018
45	1.495	.114	.044	1.683	.405	-.003
50	1.503	.247	.051	1.641	.509	.030
55	1.476	.371	.063	1.557	.559	.055
60	1.436	.455	.084	1.488	.613	.095
65	1.395	.518	.105	1.420	.672	.119
70	1.349	.579	.133	1.351	.717	.158
75	1.313	.666	.173	1.263	.729	.195
80	1.277	.723	.233			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.006	-0.473	-0.075	1.203	-0.077	-0.198
10	1.256	-.371	-.076	1.518	.049	-.206
15	1.502	-.226	-.092	1.812	.197	-.212
20	1.730	-.053	-.088	2.075	.385	-.207
25	1.882	.143	-.104	2.276	.588	-.221
30	1.957	.346	-.116	2.315	.814	-.236
35	1.977	.524	-.118	2.235	.986	-.238
40	1.957	.674	-.099	1.720	.935	-.188
45	1.920	.785	-.058			
50	1.597	.805	-.051			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.002	0.026	0.064	0.075
10	-.006	.028	.076	.092
15	-.007	.032	.090	.104
20	0	.040	.102	.123
25	.004	.047	.119	.139
30	.006	.063	.139	.163
35	.010	.068	.142	.152
40	.010	.071	.140	.119
45	.005	.063	.130	
50	-.002	.059	.094	
55	-.002	.046		
60	-.003	.045		
65	-.010	.044		
70	-.024	.037		
75	-.037	.022		
80	-.050			

TABLE 7.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.877	-0.737	0.004	1.011	-0.584	-0.035
10	.986	-.663	.016	1.207	-.456	-.059
15	1.117	-.551	.024	1.378	-.322	-.058
20	1.259	-.403	.007	1.498	-.169	-.062
25	1.351	-.262	.001	1.611	-.006	-.065
30	1.418	-.114	.003	1.682	.172	-.078
35	1.468	.043	-.002	1.705	.352	-.079
40	1.493	.205	-.007	1.676	.467	-.049
45	1.513	.360	-.004	1.621	.553	-.019
50	1.484	.464	.008	1.553	.593	.018
55	1.440	.538	.040	1.454	.640	.051
60	1.397	.558	.092	1.398	.731	.065
65	1.327	.571	.118	1.323	.777	.097
70	1.286	.606	.152	1.259	.789	.139
75	1.246	.675	.189	1.022	.635	.173
80	1.190	.705	.233			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.261	-0.271	-0.150	1.521	0.133	-0.276
10	1.484	-.148	-.151	1.784	.279	-.276
15	1.768	.013	-.156	2.041	.434	-.261
20	1.875	.203	-.160	2.245	.628	-.263
25	1.963	.391	-.158	2.375	.836	-.280
30	1.971	.572	-.156	2.310	1.024	-.267
35	1.964	.722	-.135	2.187	1.172	-.255
40	1.897	.835	-.106	1.447	.907	-.142
45	1.816	.909	-.058			
50	1.452	.849	-.037			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.014	0.024	0.082	0.115
10	-.013	.024	.092	.123
15	-.009	.032	.099	.137
20	-.006	.039	.107	.148
25	-.002	.049	.120	.158
30	.001	.057	.133	.165
35	0	.060	.131	.142
40	0	.051	.117	.074
45	-.006	.038	.107	
50	-.007	.026	.056	
55	-.009	.026		
60	-.014	.023		
65	-.023	.025		
70	-.032	.020		
75	-.045	.010		
80	-.056			

TABLE 8.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.424	-1.009	0.163	0.489	-0.868	0.113
10	.580	-.963	.164	.692	-.818	.122
15	.742	-.893	.166	.904	-.728	.109
20	.906	-.805	.163	1.111	-.616	.106
25	1.035	-.700	.156	1.289	-.482	.095
30	1.163	-.575	.145	1.446	-.319	.085
35	1.279	-.431	.134	1.554	-.153	.071
40	1.374	-.274	.116	1.601	.015	.075
45	1.427	-.127	.116	1.620	.158	.068
50	1.437	.009	.115	1.641	.311	.087
55	1.434	.123	.123	1.598	.419	.106
60	1.410	.217	.137	1.540	.491	.132
65	1.392	.328	.144	1.468	.557	.163
70	1.354	.409	.167	1.399	.621	.180
75	1.310	.469	.192	1.322	.653	.195
80	1.266	.531	.232			
85	1.220	.594	.254			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.580	-0.605	0.025	0.658	-0.227	-0.113
10	.844	-.530	.022	1.002	-.149	-.114
15	1.149	-.430	.007	1.401	-.019	-.119
20	1.421	-.286	.001	1.732	.129	-.126
25	1.662	-.116	-.015	2.045	.316	-.128
30	1.867	.073	-.024	2.035	.521	-.135
35	1.947	.249	-.024	2.368	.729	-.142
40	1.807	.341	.004	1.919	.766	-.109
45	1.702	.505	-.002	1.575	.785	-.111
50	1.661	.640	.011			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.021	0.035	0.034	0.031
10	.023	.041	.051	.063
15	.017	.043	.059	.054
20	.014	.046	.065	.058
25	.021	.050	.078	.063
30	.021	.059	.086	.084
35	.025	.071	.095	.093
40	.033	.081	.089	.065
45	.034	.083	.091	.053
50	.035	.075	.087	
55	.038	.068		
60	.034	.060		
65	.024	.066		
70	.018	.049		
75	.014	.033		
80	.023			
85	.025			

TABLE 9.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SIAT, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.563	-0.937	0.115	0.698	-0.835	0.083
10	.724	-.878	.117	.922	-.759	.073
15	.890	-.791	.106	1.134	-.647	.066
20	1.027	-.675	.095	1.346	-.495	.036
25	1.172	-.545	.075	1.539	-.322	.028
30	1.301	-.391	.071	1.665	-.150	-.028
35	1.395	-.230	.052	1.714	.103	-.025
40	1.457	-.066	.045	1.699	.241	0
45	1.489	.080	.046	1.698	.369	.051
50	1.486	.205	.052	1.707	.518	.066
55	1.460	.305	.067	1.630	.587	.092
60	1.415	.383	.098	1.565	.649	.125
65	1.373	.436	.125	1.478	.689	.160
70	1.315	.488	.153	1.408	.714	.195
75	1.283	.553	.177	1.313	.743	.217
80	1.230	.582	.212	1.100	.654	.218
85	1.183	.632	.245			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.799	-0.498	-0.050	0.956	-0.121	-0.167
10	1.086	-.401	-.056	1.349	.010	-.187
15	1.417	-.253	-.075	1.737	.163	-.209
20	1.672	-.092	-.080	2.061	.359	-.204
25	1.894	.105	-.097	2.297	.566	-.212
30	2.016	.313	-.105	2.460	.780	-.208
35	2.031	.457	.087	2.445	.946	-.191
40	1.777	.460	.002	1.721	.794	-.140
45	1.787	.616	.005	1.465	.827	-.110
50	1.757	.743	.027			
55	1.395	.718	.018			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.014	0.031	0.051	0.062
10	.012	.044	.072	.085
15	.018	.043	-----	.086
20	.027	.048	-----	.087
25	.023	.056	.098	.109
30	.025	.062	.105	.114
35	.030	.071	.109	.106
40	.033	.079	.095	.053
45	.029	.071	.092	.032
50	.025	.062	.072	
55	.019	.050	.045	
60	.019	.039		
65	.009	.052		
70	-.003	.036		
75	-.009	.021		
80	.016	.009		
85	.023			

TABLE 10.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.705	-0.823	0.074	0.817	-0.653	0.009
10	.840	-.746	.069	1.031	-.551	0
15	.987	-.639	.062	1.254	-.390	-.035
20	1.138	-.497	.030	1.449	-.212	-.052
25	1.280	-.323	.006	1.584	-.028	-.068
30	1.366	-.158	-.009	1.656	.115	-.064
35	1.423	-.002	-.007	1.631	.217	-.032
40	1.452	.137	-.003	1.608	.325	0
45	1.458	.249	.006	1.614	.455	.007
50	1.438	.342	.037	1.577	.566	.038
55	1.401	.423	.049	1.482	.615	.059
60	1.351	.454	.083	1.408	.678	.084
65	1.307	.482	.124	1.342	.706	.135
70	1.262	.537	.160	1.260	.685	.171
75	1.217	.547	.193	1.021	.587	.177
80	1.156	.587	.207			
85	1.114	.637	.233			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.039	-0.324	-0.119	1.276	0.077	-0.248
10	1.293	-.222	-.111	1.579	.195	-.252
15	1.593	-.054	-.128	1.990	.427	-.274
20	1.839	.171	-.156	2.310	.663	-.289
25	1.987	.368	-.162	2.430	.857	-.286
30	2.035	.524	-.139	2.484	1.017	-.258
35	1.854	.517	-.064	2.285	1.001	-.180
40	1.637	.481	.019	1.473	.789	-.100
45	1.435	.581	-.002			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.005	0.030	0.064	0.091
10	.010	.037	.082	.102
15	.016	.048	.087	.114
20	.022	.048	.095	.122
25	.027	.051	.100	.124
30	.028	.061	.100	.116
35	.024	.068	.092	.081
40	.030	.070	.064	.014
45	.032	.058	.056	
50	.026	.040		
55	.019	.029		
60	.011	.034		
65	-.005	.039		
70	-.012	.027		
75	-.018	.007		
80	.002			
85	.019			

TABLE 11.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.422	-1.004	0.159	0.491	-0.872	0.114
10	.582	-.965	.169	.682	-.809	.119
15	.738	-.898	.172	.903	-.725	.109
20	.897	-.813	.163	1.105	-.617	.107
25	1.036	-.705	.162	1.292	-.477	.090
30	1.163	-.589	.152	1.455	-.310	.077
35	1.277	-.435	.137	1.576	-.123	.061
40	1.370	-.271	.122	1.627	.053	.043
45	1.424	-.120	.116	1.666	.207	.049
50	1.459	.030	.113	1.671	.350	.072
55	1.471	.165	.111	1.622	.453	.096
60	1.444	.269	.129	1.538	.498	.121
65	1.410	.361	.143	1.452	.536	.152
70	1.378	.440	.164	1.385	.602	.177
75	1.332	.505	.195	1.317	.640	.201
80	1.271	.557	.233	1.129	.617	.207
85	1.225	.592	.261			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.576	-0.602	0.025	0.658	-0.235	-0.088
10	.849	-.541	.021	1.034	-.137	-.116
15	1.154	-.419	.008	1.438	-.021	-.114
20	1.442	-.281	-.008	1.772	.139	-.127
25	1.679	-.106	-.019	2.034	.329	-.126
30	1.874	.090	-.033	2.298	.547	-.131
35	1.996	.294	-.034	2.379	.766	-.148
40	1.987	.473	-.043	1.926	.795	-.120
45	1.896	.648	-.020	1.712	.882	-.148
50	1.774	.757	-.011			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.026	0.038	0.043	0.043
10	.027	.042	.060	.073
15	.024	.048	.066	.071
20	.022	.049	.072	.074
25	.025	.050	.083	.083
30	.026	.059	.092	.094
35	.035	.073	.107	.092
40	.036	.076	.119	.066
45	.034	.070	.114	.084
50	.025	.067	.098	
55	.027	.062		
60	.025	.060		
65	.025	.055		
70	.009	.050		
75	0	.033		
80	.013	.011		
85	-.002			

TABLE 12.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.549	-0.921	0.115	0.641	-0.781	0.065
10	.698	-.867	.121	.856	-.700	.056
15	.867	-.777	.107	1.083	-.584	.042
20	1.018	-.660	.103	1.299	-.438	.021
25	1.155	-.539	.086	1.484	-.264	.005
30	1.286	-.383	.063	1.611	-.075	-.013
35	1.374	-.222	.053	1.691	.107	-.027
40	1.446	-.045	.043	1.705	.275	-.024
45	1.480	.105	.037	1.710	.417	-.004
50	1.483	.246	.040	1.663	.519	.025
55	1.475	.357	.058	1.605	.585	.065
60	1.424	.426	.082	1.512	.602	.110
65	1.372	.478	.112	1.405	.635	.124
70	1.335	.531	.142	1.337	.662	.158
75	1.314	.634	.178	1.261	.685	.195
80	1.216	.598	.211	1.048	.597	.203
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.799	-.0497	-0.038	0.944	-0.116	-0.156
10	1.084	-.397	-.048	1.378	.013	-.183
15	1.405	-.250	-.077	1.760	.170	-.198
20	1.698	-.067	-.094	2.063	.361	-.199
25	1.887	.131	-.108	2.296	.573	-.194
30	2.058	.337	-.114	2.466	.795	-.209
35	2.095	.529	-.108	2.469	1.006	-.219
40	2.059	.687	-.080	1.782	.851	-.176
45	1.999	.801	-.052			
50	1.683	.798	-.026			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.018	0.032	0.053	0.067
10	.019	.043	.075	.100
15	.022	.052	.087	.100
20	.024	.052	.093	.103
25	.028	.055	.104	.109
30	.029	.064	.109	.111
35	.032	.071	.121	.104
40	.030	.064	.123	.075
45	.022	.063	.112	
50	.013	.054	.092	
55	.011	.049		
60	.010	.041		
65	.006	.044		
70	-.007	.041		
75	-.028	.021		
80	-.004	.009		

TABLE 13.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.671	-0.827	0.079	0.818	-0.662	0.014
10	.817	-.751	.080	1.024	-.551	.002
15	.966	-.642	.057	1.258	-.397	-.031
20	1.115	-.504	.044	1.440	-.206	-.053
25	1.246	-.338	.019	1.583	-.034	-.070
30	1.350	-.160	-.005	1.671	.141	-.070
35	1.425	.012	-.014	1.703	.307	-.064
40	1.466	.175	-.018	1.689	.470	-.063
45	1.478	.322	-.012	1.655	.560	-.022
50	1.460	.454	-.005	1.583	.607	.021
55	1.423	.538	.017	1.501	.646	.051
60	1.369	.540	.067	1.391	.693	.074
65	1.319	.567	.102	1.323	.723	.111
70	1.285	.593	.156	1.253	.700	.166
75	1.256	.662	.197	1.063	.620	.172
80	1.246	.625	.276			
85	1.112	.626	.237			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.059	-0.326	-0.111	1.282	0.075	-0.304
10	1.333	-.208	-.117	1.615	.191	-.237
15	1.589	-.051	-.126	1.986	.399	-.252
20	1.850	.159	-.149	2.233	.621	-.265
25	1.993	.378	-.170	2.397	.844	-.274
30	2.082	.576	-.153	2.570	1.045	-.235
35	2.054	.735	-.135	2.528	1.185	-.202
40	1.996	.853	-.092	1.582	.886	-.115
45	1.902	.922	-.046			
50	1.431	.770	-.013			
55	1.277	.747	.029			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.006	0.033	0.068	0.101
10	.012	.042	.085	.114
15	.020	.054	.096	.124
20	.030	.058	.099	.118
25	.039	.060	.107	.128
30	.033	.060	.110	.130
35	.026	.062	.119	.131
40	.018	.053	.102	.062
45	.018	.036	.089	
50	.019	.027	.045	
55	.016	.022	.020	
60	.002	.021		
65	-.007	.027		
70	-.017	.027		
75	-.034	.022		
80	-.056			
85	.009			

TABLE 14.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, FULL-SPAN SLAT WITH FENCES ON, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.400	-0.996	0.156	0.465	-0.862	0.106
10	.561	-.952	.156	.666	-.811	.113
15	.729	-.897	.169	.892	-.728	.107
20	.884	-.805	.156	1.096	-.614	.101
25	1.026	-.700	.157	1.284	-.475	.084
30	1.153	-.577	.149	1.445	-.309	.073
35	1.268	-.429	.133	1.564	-.120	.059
40	1.363	-.269	.118	1.662	.057	.050
45	1.422	-.113	.110	1.670	.215	.058
50	1.456	.034	.110	1.666	.348	.074
55	1.463	.163	.112	1.619	.455	.099
60	1.433	.259	.127	1.549	.516	.131
65	1.391	.347	.137	1.466	.558	.158
70	1.356	.422	.160	1.393	.624	.170
75	1.318	.491	.192	1.333	.666	.211
80	1.259	.547	.225	1.253	.689	.238
85	1.212	.594	.259			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.518	-0.601	0.028	0.562	-0.249	-0.073
10	.811	-.534	.014	.979	-.154	-.114
15	1.135	-.427	.006	1.410	-.026	-.121
20	1.427	-.279	-.011	1.732	.132	-.122
25	1.671	-.103	-.018	2.043	.327	-.128
30	1.875	.087	-.022	2.300	.546	-.122
35	1.995	.295	-.016	2.392	.777	-.146
40	1.991	.478	-.017	2.466	.986	-.114
45	1.965	.623	-.004	2.331	1.101	-.085
50	1.953	.769	.016	2.246	1.242	-.072
55	1.878	.868	.063			
60	1.763	.921	.099			
65	1.620	.939	.121			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.027	0.040	0.042	0.033
10	.029	.046	.061	.072
15	.025	.047	.068	.055
20	.024	.047	.075	.075
25	.026	.050	.081	.079
30	.026	.057	.086	.091
35	.032	.072	.105	.094
40	.033	.075	.119	.125
45	.031	.071	.134	.129
50	.023	.065	.101	.129
55	.025	.062	.090	
60	.025	.058	.075	
65	.021	.054	.054	
70	.008	.053		
75	-.001	.038		
80	.014	.015		
85	-.005			

TABLE 15.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, FULL-SPAN SLAT WITH FENCES ON, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.515	-0.941	0.113	0.601	-0.798	0.072
10	.672	-.876	.125	.838	-.725	.060
15	.840	-.801	.120	1.058	-.611	.051
20	.993	-.681	.098	1.293	-.452	.022
25	1.148	-.547	.088	1.486	-.269	.003
30	1.284	-.384	.058	1.622	-.089	-.013
35	1.381	-.226	.055	1.698	.103	-.020
40	1.445	-.048	.040	1.722	.274	-.016
45	1.479	.094	.039	1.717	.415	.003
50	1.499	.245	.042	1.687	.525	.028
55	1.473	.362	.060	1.620	.589	.076
60	1.423	.417	.087	1.524	.605	.111
65	1.375	.474	.107	1.420	.643	.131
70	1.329	.538	.142	1.368	.695	.173
75	1.293	.619	.177	1.290	.724	.206
80	1.227	.603	.189			
85	1.176	.636	.242			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.737	-0.523	-0.028	0.867	-0.144	-0.158
10	1.049	-.419	-.054	1.316	-.003	-.194
15	1.402	-.262	-.080	1.728	.155	-.202
20	1.680	-.073	-.095	2.046	.346	-.196
25	1.904	.124	-.105	2.306	.562	-.193
30	2.061	.337	-.101	2.478	.796	-.199
35	2.105	.530	-.102	2.509	1.017	-.194
40	2.067	.693	-.072	2.426	1.170	-.173
45	2.023	.805	-.039	2.305	1.248	-.109
50	1.957	.921	0	2.144	1.181	-.063
55	1.836	.972	.052			
60	1.689	.991	.085			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.023	0.038	0.048	0.061
10	.021	.041	.072	.099
15	.022	.051	.087	.098
20	.023	.033	.096	.104
25	.026	.055	.106	.113
30	.028	.063	.112	.113
35	.029	.071	.128	.108
40	.032	.063	.122	.118
45	.021	.057	.113	.123
50	.013	.054	.093	.098
55	.010	.048	.075	
60	.008	.039	.056	
65	.004	.039		
70	-.004	.035		
75	-.026	.024		
80	-.011			
85	.002			

TABLE 16.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, FULL-SPAN SLAT WITH FENCES ON, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.626	-0.831	0.087	0.747	-0.647	0.013
10	.800	-.754	.081	.971	-.577	.005
15	.940	-.649	.069	1.231	-.399	-.038
20	1.093	-.517	.047	1.426	-.219	-.054
25	1.236	-.344	.023	1.578	-.042	-.063
30	1.354	-.158	-.008	1.660	.133	-.061
35	1.418	0	-.005	1.711	.307	-.057
40	1.465	.178	-.014	1.700	.473	-.057
45	1.466	.307	-.009	1.654	.561	-.025
50	1.463	.450	-.007	1.586	.631	.016
55	1.402	.511	.029	1.498	.648	.061
60	1.358	.537	.067	1.391	.694	.068
65	1.308	.549	.112	1.336	.741	.114
70	1.278	.603	.155	1.265	.738	.165
75	1.244	.655	.191	1.198	.736	.199
80	1.240	.625	.274	1.127	.736	.228
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.966	-0.367	-0.088	1.166	0.039	-0.225
10	1.267	-.234	-.105	1.538	.164	-.222
15	1.562	-.065	-.121	1.933	.386	-.250
20	1.823	.149	-.145	2.209	.623	-.250
25	1.991	.363	-.159	2.391	.840	-.258
30	2.081	.577	-.138	2.528	1.056	-.232
35	2.055	.728	-.115	2.513	1.199	-.190
40	1.997	.853	-.074	2.387	1.319	-.151
45	1.924	.948	-.046	2.163	1.354	-.109
50	1.830	1.010	.010	1.963	1.329	-.031
55	1.693	1.031	.051			
60	1.536	1.019	.075			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.009	0.013	0.056	0.088
10	.013	.015	.083	.115
15	.018	.020	.096	.116
20	.024	.021	.098	.121
25	.031	.021	.103	.123
30	.030	.022	.109	.114
35	.025	.023	.116	.121
40	.015	.018	.102	.124
45	.015	.013	.086	.106
50	.020	.011	.071	.064
55	.014	.008	.050	
60	.001	.006	.023	
65	-.007	.008		
70	-.019	.009		
75	-.033	.007		
80	-.050	.004		

TABLE 17.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, OUTBOARD SLAT WITH FENCES ON, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.507	-1.051	0.124	0.589	-0.892	0.073
10	.665	-.986	.136	.788	-.815	.077
15	.830	-.902	.133	.991	-.725	.083
20	.983	-.806	.134	1.179	-.597	.084
25	1.112	-.684	.134	1.344	-.456	.072
30	1.229	-.550	.123	1.468	-.294	.068
35	1.328	-.404	.112	1.553	-.117	.057
40	1.395	-.250	.110	1.625	.053	.058
45	1.448	-.100	.102	1.656	.212	.057
50	1.481	.041	.104	1.642	.339	.069
55	1.469	.182	.108	1.597	.444	.095
60	1.456	.289	.122	1.528	.518	.121
65	1.418	.390	.138	1.465	.579	.148
70	1.388	.481	.153	1.410	.655	.174
75	1.344	.555	.178	1.346	.700	.215
80	1.308	.640	.221	1.262	.736	.234
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.699	-0.617	-0.010	0.822	-0.226	-0.136
10	.967	-.532	-.004	1.162	-.133	-.131
15	1.222	-.412	-.006	1.502	-.010	-.130
20	1.516	-.274	-.011	1.789	.163	-.141
25	1.698	-.088	-.019	2.064	.353	-.135
30	1.823	.109	-.034	2.203	.589	-.171
35	1.871	.302	-.044	2.205	.784	-.174
40	1.900	.484	-.046	2.200	.967	-.165
45	1.895	.625	-.022	2.141	1.090	-.136
50	1.864	.739	.010	1.645	.987	-.102
55	1.824	.864	.037			
60	1.730	.937	.074			
65	1.619	.987	.104			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.017	0.030	0.039	0.037
10	.011	.031	.053	.052
15	.009	.032	.064	.073
20	.008	.039	.075	.089
25	.010	.047	.089	.102
30	.019	.065	.116	.142
35	.028	.079	.130	.155
40	.025	.081	.140	.153
45	.024	.080	.133	.140
50	.019	.073	.121	.081
55	.010	.071	.111	
60	.009	.069	.097	
65	.003	.061	.082	
70	-.004	.055		
75	-.017	.043		
80	-.037	.016		

TABLE 18.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, OUTBOARD SLAT WITH FENCES ON, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.680	-0.925	0.060	0.800	-0.770	0.011
10	.832	-.852	.065	.996	-.681	.015
15	.982	-.757	.066	1.191	-.565	.010
20	1.117	-.638	.064	1.371	-.414	.004
25	1.257	-.500	.055	1.526	-.248	.005
30	1.356	-.354	.046	1.608	-.070	-.003
35	1.443	-.203	.043	1.668	.103	-.018
40	1.484	-.035	.042	1.691	.268	-.007
45	1.502	.100	.043	1.673	.399	.004
50	1.507	.241	.050	1.635	.507	.038
55	1.483	.366	.058	1.573	.566	.075
60	1.445	.450	.087	1.490	.620	.092
65	1.406	.511	.110	1.432	.693	.134
70	1.354	.586	.143	1.361	.740	.167
75	1.327	.694	.175	1.285	.757	.204
80	1.286	.751	.228			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.955	-0.478	-0.075	1.170	-0.099	-0.207
10	1.226	-.380	-.079	1.479	.023	-.208
15	1.479	-.232	-.092	1.791	.183	-.206
20	1.718	-.057	-.090	2.065	.373	-.207
25	1.888	.136	-.100	2.292	.591	-.215
30	1.963	.340	-.115	2.327	.820	-.240
35	1.965	.521	-.108	2.291	1.007	-.226
40	1.978	.686	-.090	2.200	1.137	-.197
45	1.923	.793	-.054	2.108	1.228	-.157
50	1.848	.888	-.012	1.540	1.033	-.093
55	1.746	.963	.015			
60	1.641	1.021	.046			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.005	0.027	0.064	0.071
10	-.005	.025	.074	.087
15	-.007	.033	.084	.107
20	-.004	.039	.101	.116
25	-.001	.049	.115	.133
30	.007	.061	.137	.162
35	.007	.066	.142	.151
40	.006	.070	.137	.146
45	.001	.063	.124	.127
50	-.003	.057	.109	.059
55	-.006	.049	.090	
60	-.005	.042	.069	
65	-.012	.036		
70	-.026	.034		
75	-.039	.030		
80	-.048			

TABLE 19.- AERODYNAMIC DATA FOR UP-AT-TIP ROTATION, OUTBOARD SLAT WITH FENCES ON, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.864	-0.761	0.008	0.998	-0.585	-0.055
10	.990	-.665	.005	1.204	-.473	-.063
15	1.130	-.555	.006	1.362	-.340	-.055
20	1.246	-.422	-.004	1.501	-.190	-.051
25	1.349	-.283	-.003	1.630	-.017	-.053
30	1.420	-.134	-.001	1.687	.161	-.066
35	1.475	.027	-.001	1.713	.328	-.063
40	1.500	.192	-.012	1.691	.467	-.043
45	1.508	.335	-.004	1.628	.552	-.009
50	1.488	.454	.012	1.564	.609	.032
55	1.451	.529	.045	1.456	.630	.061
60	1.381	.566	.074	1.401	.736	.073
65	1.331	.575	.121	1.342	.804	.103
70	1.285	.613	.157	1.273	.803	.147
75	1.248	.696	.188	1.202	.806	.196
80	1.199	.741	.230			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.219	-0.283	-0.148	1.463	0.116	-0.276
10	1.451	-.167	-.156	1.732	.242	-.265
15	1.674	-.001	-.140	1.992	.410	-.260
20	1.853	.185	-.151	2.216	.612	-.255
25	1.957	.370	-.149	2.379	.827	-.264
30	1.991	.575	-.144	2.304	1.020	-.256
35	1.961	.722	-.128	2.229	1.200	-.255
40	1.901	.832	-.082	2.070	1.281	-.209
45	1.827	.931	-.048	1.946	1.326	-.148
50	1.718	.996	-.027	1.760	1.321	-.107
55	1.619	1.061	.001			
60	1.510	1.049	.053			
65	1.393	1.022	.108			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.013	0.022	0.082	0.104
10	-.013	.025	.089	.118
15	-.012	.030	.096	.132
20	-.006	.039	.105	.142
25	-.005	.047	.117	.156
30	0	.054	.132	.161
35	0	.057	.131	.141
40	-.004	.045	.114	.121
45	-.010	.030	.097	.102
50	-.011	.023	.077	.074
55	-.013	.038	.066	
60	-.016	.021	.050	
65	-.029	.016	.052	
70	-.037	.020		
75	-.047	.024		
80	-.062			

TABLE 20.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 0^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.279	-1.128	0.267	0.304	-0.996	0.238
10	.430	-1.095	.281	.477	-.950	.253
15	.570	-1.050	.291	.659	-.908	.277
20	.714	-.984	.311	.835	-.827	.291
25	.848	-.909	.318	.985	-.738	.288
30	.937	-.815	.295	1.090	-.618	.293
35	1.051	-.701	.320	1.189	-.485	.294
40	1.149	-.580	.320	1.300	-.341	.298
45	1.225	-.460	.312	1.365	-.202	.298
50	1.287	-.328	.321	1.360	-.058	.288
55	1.312	-.207	.320	1.336	.040	.281
60	1.325	-.080	.320	1.295	.135	.291
65	1.320	.031	.329	1.277	.229	.302
70	1.295	.139	.334	1.256	.346	.312
75	1.283	.237	.342			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.358	-0.734	0.169	0.423	-0.356	0.066
10	.571	-.696	.207	.683	-.325	.111
15	.794	-.631	.215	.925	-.256	.133
20	.991	-.534	.229	1.089	-.142	.133
25	1.187	-.428	.232	1.178	-.027	.115
30	1.281	-.285	.224	1.176	.093	.095
35	1.283	-.135	.201	1.271	.267	.098
40	1.331	.006	.210	1.254	.400	.073
45	1.342	.118	.206	1.215	.498	.062
50	1.338	.235	.209			
55	1.322	.363	.205			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.003	0.006	-0.005	-0.026
10	-.009	0	.001	-.024
15	-.014	-.004	.004	-.020
20	-.007	0	.017	-.006
25	-.013	.007	.022	-.004
30	.008	.020	.035	.003
35	.007	.027	.043	.028
40	.003	.030	.057	.028
45	.003	.037	.062	.032
50	.007	.039	.062	
55	.010	.038	.061	
60	.006	.039		
65	.007	.039		
70	.009	.049		
75	.011			

TABLE 21.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.583	-1.043	0.129	0.661	-0.886	0.087
10	.747	-.983	.140	.860	-.817	.100
15	.884	-.902	.139	1.046	-.726	.105
20	1.022	-.817	.154	1.222	-.619	.096
25	1.128	-.711	.147	1.342	-.493	.096
30	1.215	-.586	.151	1.421	-.343	.106
35	1.301	-.456	.152	1.483	-.169	.088
40	1.351	-.316	.151	1.537	-.009	.095
45	1.415	-.190	.160	1.502	.122	.091
50	1.413	-.068	.158	1.376	.157	.094
55	1.416	.060	.164	1.305	.213	.124
60	1.381	.158	.169	1.263	.293	.137
65	1.333	.228	.190	1.223	.379	.164
70	1.296	.290	.213	1.178	.448	.199
75	1.256	.360	.238			
80	1.211	.436	.263			
85	1.193	.529	.261			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.790	-0.608	0.002	0.919	-0.213	-0.122
10	1.034	-.539	.015	1.233	-.133	-.107
15	1.299	-.424	.019	1.522	-.021	-.099
20	1.508	-.297	.006	1.780	.139	-.117
25	1.627	-.142	.011	1.931	.321	-.119
30	1.643	.016	.003	1.453	.368	-.151
35	1.591	.173	-.016	1.412	.520	-.164
40	1.523	.268	.007	1.327	.708	-.158
45	1.448	.363	.027			
50	1.392	.452	.039			
55	1.324	.537	.058			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.025	-0.006	0.025	0.044
10	-.044	-.018	.026	.043
15	-.037	-.015	.030	.049
20	-.037	-.011	.047	.064
25	-.031	.004	.056	.072
30	-.022	.027	.070	.031
35	-.016	.048	.070	.046
40	-.013	.054	.071	.048
45	-.006	.051	.058	
50	0	.038	.044	
55	.009	.038	.034	
60	-.014	.035		
65	-.014	.039		
70	-.018	.034		
75	-.023			
80	-.026			
85	-.031			

TABLE 22.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.750	-0.942	0.067	0.883	-0.778	0.018
10	.905	-.861	.068	1.077	-.692	.035
15	1.051	-.777	.080	1.244	-.572	.024
20	1.157	-.666	.081	1.406	-.436	.027
25	1.258	-.547	.072	1.514	-.302	.023
30	1.341	-.402	.068	1.567	-.133	.088
35	1.416	-.263	.074	1.623	.039	.018
40	1.448	-.125	.089	1.649	.186	.021
45	1.453	.003	.083	1.534	.264	.043
50	1.441	.105	.097	1.380	.252	.064
55	1.409	.196	.110	1.297	.304	.100
60	1.370	.276	.133	1.259	.386	.124
65	1.300	.329	.210	1.206	.458	.194
70	1.273	.407	.187	1.147	.512	.174
75	1.142	.421	.226			
80	1.102	.466	.239			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.034	-0.489	-0.061	1.243	-0.092	-0.198
10	1.312	-.381	-.059	1.558	.021	-.182
15	1.548	-.248	-.075	1.840	.171	-.202
20	1.749	-.082	-.075	2.068	.363	-.212
25	1.808	.075	-.074	2.097	.524	-.207
30	1.759	.227	-.070	1.504	.533	-.195
35	1.617	.315	-.052	1.371	.629	-.176
40	1.492	.385	-.019			
45	1.434	.467	.008			
50	1.347	.536	.025			
55	1.258	.600	.053			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.048	-0.026	0.035	0.073
10	-.049	-.030	.040	.066
15	-.053	-.024	.046	.083
20	-.046	-.010	.066	.088
25	-.038	.004	.070	.084
30	-.033	.028	.074	.034
35	-.029	.045	.064	.052
40	-.027	.049	.053	
45	-.025	.028	.036	
50	-.027	.016	.019	
55	-.032	.009	.007	
60	-.042	.001		
65	-.055	0		
70	-.066	.009		
75	.043			
80	.033			

TABLE 23.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.944	-0.764	0.012	1.112	-0.593	-0.049
10	1.079	-.678	.020	1.267	-.483	-.059
15	1.192	-.567	.024	1.432	-.357	-.046
20	1.290	-.452	.012	1.544	-.208	-.049
25	1.376	-.309	.021	1.597	-.055	-.056
30	1.437	-.169	.025	1.627	.100	-.042
35	1.479	-.032	.027	1.641	.247	-.030
40	1.470	.092	.030	1.583	.341	.001
45	1.431	.188	.060	1.392	.313	.043
50	1.412	.304	.068	1.277	.328	.058
55	1.357	.366	.080	1.207	.381	.080
60	1.277	.367	.124	1.154	.453	.105
65	1.256	.427	.145	1.100	.488	.142
70	1.269	.581	.131			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.304	-0.392	-0.135	1.526	-0.104	-0.248
10	1.548	-.317	-.124	1.853	-.255	-.260
15	1.791	-.191	-.143	2.069	-.426	-.251
20	1.871	-.005	-.141	2.159	-.589	-.245
25	1.808	.154	-.137	1.551	.552	-.190
30	1.699	.280	-.110	1.399	.647	-.173
35	1.522	.378	-.084	1.269	.724	-.170
40	1.424	.407	-.039			
45	1.353	.472	-.002			
50	1.248	.530	.039			
55		.582	.050			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.055	-0.020	0.055	0.101
10	-.058	-.025	.049	.123
15	-.057	-.015	.057	.120
20	-.051	0	.066	.098
25	-.043	.014	.064	.012
30	-.042	.026	.064	.022
35	-.040	.037	.059	.007
40	-.032	.038	.037	
45	-.030	.002	.009	
50	-.042	-.013	-.006	
55	-.061	-.015	-.024	
60	-.066	-.016		
65	-.081	-.039		
70	-.096			

TABLE 24.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.738	-0.923	0.065	0.876	-0.773	0.018
10	.899	-.846	.065	1.067	-.682	.032
15	1.038	-.746	.078	1.242	-.571	.027
20	1.172	-.637	.071	1.412	-.427	.026
25	1.279	-.514	.073	1.551	-.268	.014
30	1.377	-.370	.068	1.638	-.088	-.003
35	1.447	-.204	.059	1.709	.098	-.008
40	1.508	-.037	.053	1.738	.274	-.010
45	1.541	.113	.052	1.709	.414	.007
50	1.540	.256	.061	1.665	.534	.029
55	1.507	.388	.072	1.584	.610	.062
60	1.466	.500	.082	1.235	.366	.126
65	1.414	.585	.105	1.236	.501	.155
70	1.340	.644	.133			
75	1.266	.688	.163			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.033	-0.473	-0.066	1.229	-0.088	-0.191
10	1.303	-.379	-.064	1.543	.029	-.187
15	1.554	-.252	-.077	1.839	.167	-.193
20	1.753	-.077	-.080	2.115	.379	-.218
25	1.898	.112	-.094	2.296	.583	-.226
30	1.942	.303	-.104	2.313	.799	-.252
35	1.914	.477	-.104	1.633	.754	-.209
40	1.450	.386	-.060	1.284	.720	-.172
45	1.326	.441	-.030			
50	1.272	.508	-.001			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.036	-0.005	0.043	0.064
10	-.042	-.002	.055	.072
15	-.042	0	.056	.088
20	-.036	.006	.071	.098
25	-.028	.019	.088	.127
30	-.021	.036	.102	.134
35	-.018	.046	.105	.063
40	-.014	.054	.053	.017
45	-.011	.056	.031	
50	-.005	.066	.022	
55	.004	.049		
60	.013	.023		
65	-.001	0		
70	-.005			
75	-.004			

TABLE 25.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, BASIC LEADING EDGE WITH FENCES ON, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.935	-0.763	-0.003	1.081	-0.606	-0.042
10	1.071	-.678	.012	1.245	-.499	-.043
15	1.196	-.566	.016	1.420	-.364	-.045
20	1.309	-.439	.011	1.597	-.168	-.068
25	1.403	-.292	.008	1.662	-.012	-.068
30	1.477	-.123	-.004	1.715	.157	-.053
35	1.524	.030	-.008	1.726	.322	-.059
40	1.537	.180	-.004	1.717	.470	-.041
45	1.529	.318	-.002	1.665	.572	-.009
50	1.495	.442	.018	1.593	.683	.013
55	1.447	.545	.033	1.504	.750	.042
60	1.379	.629	.050	1.236	.567	.107
65	1.312	.705	.062			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.282	-0.311	-0.125	1.519	0.100	-0.252
10	1.527	-.183	-.149	1.786	.219	-.236
15	1.779	-.010	-.153	2.045	.387	-.243
20	1.954	.196	-.159	2.312	.665	-.299
25	2.004	.373	-.155	2.313	.829	-.275
30	1.972	.521	-.133	1.611	.735	-.204
35	1.875	.656	-.125			
40	1.355	.466	-.047			
45	1.237	.507	-.010			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.046	0.001	0.057	0.099
10	-.046	.003	.059	.099
15	-.040	.022	.070	.120
20	-.032	.024	.084	.131
25	-.024	.038	.087	.118
30	-.015	.048	.112	.058
35	-.015	.051	.107	
40	-.020	.052	.022	
45	-.020	.069	-.007	
50	------	.071		
55	-.010	.060		
60	-.020	-.011		
65	-.021			

TABLE 26.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.522	-1.051	0.115	0.615	-0.910	0.079
10	.685	-.982	.126	.809	-.839	.093
15	.850	-.921	.134	1.012	-.758	.100
20	.986	-.817	.139	1.192	-.644	.103
25	1.101	-.714	.143	1.332	-.519	.108
30	1.201	-.605	.142	1.432	-.377	.113
35	1.252	-.487	.145	1.482	-.249	.105
40	1.325	-.349	.143	1.528	-.076	.104
45	1.368	-.219	.138	1.555	.057	.114
50	1.381	-.098	.148	1.557	.193	.130
55	1.399	.035	.162	1.523	.285	.158
60	1.418	.177	.168	1.473	.370	.180
65	1.399	.285	.178	1.438	.476	.213
70	1.362	.375	.206	1.360	.559	.227
75	1.309	.435	.228			
80	1.255	.492	.249			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.693	-0.624	0.004	0.748	-0.256	-0.118
10	.957	-.556	.019	1.126	-.182	-.097
15	1.255	-.452	.022	1.462	-.048	-.094
20	1.483	-.322	.022	1.785	.090	-.095
25	1.666	-.158	.027	2.045	.269	-.093
30	1.813	.009	.022	2.261	.491	-.101
35	1.878	.188	.026	2.349	.690	-.102
40	1.777	.305	.040	2.208	.810	-.083
45	1.774	.466	.040	1.997	.889	-.078
50	1.688	.583	.049			
55	1.611	.656	.088			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	0.172	0.014	0.051	0.063
10	.170	.001	.040	.058
15	.172	-.004	-----	.043
20	.170	0	.045	.040
25	.169	.010	.058	.051
30	.170	.020	.063	.073
35	.170	.036	.068	.079
40	.171	.041	.064	.062
45	.173	.040	.068	.060
50	.173	.043	.059	
55	.174	.040	.047	
60	.175	.034		
65	.176	.013		
70	.177	-.003		
75	.178			
80	.178			

TABLE 27.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.721	-0.928	0.138	0.803	-0.777	0.014
10	.863	-.861	.078	1.034	-.701	.029
15	1.006	-.760	.074	1.208	-.583	.022
20	1.133	-.654	.078	1.384	-.459	.026
25	1.236	-.543	.076	1.472	-.322	.036
30	1.304	-.422	.090	1.533	-.176	.038
35	1.327	-.305	.087	1.549	-.026	.037
40	1.363	-.168	.098	1.557	.110	.046
45	1.378	-.059	.108	1.555	.226	.062
50	1.375	.055	.116	1.523	.325	.090
55	1.377	.174	.130	1.459	.391	.124
60	1.351	.274	.143	1.405	.449	.158
65	1.323	.341	.165	1.362	.583	.164
70	1.282	.415	.194	1.291	.668	.191
75	1.232	.486	.214			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.929	-0.503	-0.057	1.077	-0.095	-0.190
10	1.245	-.404	-.063	1.453	.015	-.192
15	1.524	-.269	-.069	1.791	.161	-.186
20	1.737	-.103	-.063	2.081	.349	-.186
25	1.898	.073	-.066	2.271	.551	-.194
30	1.955	.243	-.061	2.400	.746	-.182
35	1.854	.359	-.046	2.368	.894	-.158
40	1.769	.490	-.007	2.113	.917	-.119
45	1.718	.605	.011			
50	1.642	.695	.026			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.034	0	0.048	0.080
10	-.035	-.011	.045	.081
15	-.039	-.007	.046	.062
20	-.034	.001	.053	.072
25	-.029	.014	.062	.083
30	-.022	.027	.066	.086
35	-.018	.042	.060	.069
40	-.016	.034	.054	.047
45	-.013	.027	.047	
50	-.021	.023	.037	
55	-.035	.001		
60	-.038	-.003		
65	-.039	-.012		
70	-.036	-.006		
75	-.038			

TABLE 28.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.906	-0.772	-0.004	1.066	-0.614	-0.058
10	1.063	-.685	-.002	1.273	-.506	-.051
15	1.191	-.570	.006	1.433	-.370	-.050
20	1.281	-.467	.014	1.551	-.242	-.037
25	1.345	-.324	.016	1.583	-.104	-.027
30	1.364	-.159	.037	1.549	.022	-.004
35	1.377	-.118	.052	1.557	.144	.017
40	1.379	0	.060	1.540	.264	.030
45	1.360	.100	.069	1.505	.350	.061
50	1.352	.205	.082	1.461	.423	.095
55	1.313	.264	.108	1.398	.463	.118
60	1.275	.329	.129	1.327	.536	.149
65	1.244	.420	.141			
70	1.217	.580	.126			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.259	-0.326	-0.145	1.439	0.103	-0.260
10	1.504	-.165	-.144	1.694	.233	-.251
15	1.748	-.045	-.126	1.986	.404	-.230
20	1.892	.109	-.114	2.226	.585	-.227
25	1.998	.301	-.107	2.344	.783	-.217
30	1.932	.433	-.078	2.364	.937	-.189
35	1.774	.469	-.031	2.153	.958	-.135
40	1.654	.546	-.004			
45	1.627	.694	.011			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.034	-0.002	0.059	0.033
10	-.048	-.013	.047	.024
15	-.048	-.006	.049	.023
20	-.036	.015	.055	.025
25	-.027	.022	.066	.026
30	-.021	.028	.065	.023
35	-.020	.025	.048	.013
40	-.020	.019	.034	
45	-.020	.013	.032	
50	-.045	.002		
55	-.054	-.012		
60	-.052	-.029		
65	-.058			
70	-.043			

TABLE 29.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 20^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.546	-1.049	0.118	0.619	-0.897	0.083
10	.707	-.995	.123	.837	-.829	.086
15	.864	-.909	.126	1.041	-.745	.102
20	1.013	-.812	.134	1.228	-.634	.102
25	1.139	-.700	.135	1.378	-.503	.101
30	1.243	-.575	.133	1.507	-.343	.105
35	1.347	-.435	.132	1.612	-.167	.097
40	1.435	-.278	.131	1.699	.016	.094
45	1.489	-.129	.129	1.754	.190	.097
50	1.535	.032	.133	1.731	.343	.105
55	1.527	.160	.145	1.709	.485	.122
60	1.518	.299	.153	1.622	.579	.153
65	1.481	.418	.164	1.525	.633	.189
70	1.428	.518	.185	1.453	.701	.219
75	1.378	.602	.201			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.698	-0.633	0.002	0.757	-0.267	-0.107
10	.993	-.554	.008	1.131	-.164	-.113
15	1.281	-.454	.020	1.510	-.040	-.081
20	1.516	-.311	.017	1.808	.110	-.100
25	1.732	-.146	.023	2.084	.300	-.102
30	1.914	.047	.016	2.277	.529	-.122
35	2.010	.257	.013	2.397	.747	-.132
40	1.989	.439	.009	2.410	.945	-.119
45	1.982	.590	.028			
50	1.890	.715	.046			
55	1.773	.795	.072			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.016	0.010	0.124	0.076
10	-.032	-.002	.123	.076
15	-.029	-.006	.123	.073
20	-.030	-.003	.122	.072
25	-.033	.006	.121	.069
30	-.009	.016	.119	.066
35	-.022	.032	.117	.065
40	-.017	.050	.117	.058
45	-.017	.046	.117	
50	-.013	.057	.116	
55	-.009	.061	.117	
60	-.012	.054		
65	-.016	.034		
70	-.013	.018		
75	-.018			

TABLE 30.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 40^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.720	-0.933	0.063	0.839	-0.789	0.014
10	.873	-.848	.058	1.044	-.700	.025
15	1.024	-.757	.066	1.244	-.597	.028
20	1.163	-.651	.066	1.414	-.446	.019
25	1.279	-.524	.061	1.557	-.290	.017
30	1.367	-.381	.058	1.678	-.116	.008
35	1.464	-.220	.058	1.763	.084	-.004
40	1.529	-.049	.046	1.814	.266	-.003
45	1.562	.104	.048	1.819	.433	.021
50	1.569	.258	.063	1.753	.555	.034
55	1.548	.387	.072	1.691	.660	.075
60	1.502	.497	.091	1.594	.727	.106
65	1.447	.590	.104	1.481	.760	.145
70	1.382	.665	.125			
75	1.308	.715	.151			
80	1.229	.753	.186			
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	0.972	-0.511	-0.059	1.095	-0.104	-0.183
10	1.264	-.397	-.065	1.466	.013	-.192
15	1.555	-.268	-.073	1.816	.157	-.182
20	1.768	-.096	-.070	2.103	.348	-.186
25	1.934	.092	-.070	2.332	.574	-.188
30	2.068	.294	-.075	2.416	.793	-.191
35	2.102	.489	-.076	2.431	.963	-.170
40	2.017	.644	-.059	2.364	1.102	-.149
45	1.958	.769	-.029	1.767	.867	-.063
50	1.833	.859	.005			
55	1.702	.916	.040			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.038	0.173	0.049	0.090
10	-.043	.154	.049	.088
15	-.042	.155	.055	.080
20	-.038	.155	.061	.090
25	-.032	.154	.069	.097
30	-.026	.155	.082	.075
35	-.026	.155	.096	.084
40	-.023	.156	.087	.096
45	-.019	.156	.085	.022
50	-.013	.157	.077	
55	-.014	.158	.055	
60	-.024	.159		
65	-.026	.158		
70	-.002			
75	-.025			
80	-.031			

TABLE 31.- AERODYNAMIC DATA FOR DOWN-AT-TIP ROTATION, INBOARD SLAT WITH FENCES ON, AND $\delta_f = 60^\circ$

(a) Wing data

α, deg	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$	$C_{L,s}$	$C_{D,s}$	$C_{m,s}$
	$C_{T,s} = 0.90$			$C_{T,s} = 0.80$		
5	0.928	-0.774	-0.006	1.067	-0.622	-0.057
10	1.079	-.686	.006	1.254	-.514	-.051
15	1.193	-.570	.007	1.431	-.382	-.045
20	1.306	-.433	0	1.592	-.207	-.059
25	1.414	-.305	.011	1.668	-.044	-.051
30	1.492	-.133	0	1.730	.132	-.051
35	1.529	.016	.004	1.765	.304	-.042
40	1.568	.180	.012	1.761	.462	-.031
45	1.556	.324	.012	1.708	.563	.008
50	1.532	.448	.029	1.652	.687	.031
55	1.484	.572	.040	1.566	.759	.061
60	1.430	.662	.060	1.436	.783	.092
65	1.352	.727	.069	1.324	.834	.099
70	1.266	.764	.094	1.255	.921	.123
75	1.185	.793	.126	1.183	.929	.184
80	1.115	.797	.147	1.114	.926	.234
	$C_{T,s} = 0.60$			$C_{T,s} = 0.30$		
5	1.256	-0.321	-0.143	1.476	0.083	-0.268
10	1.552	-.190	-.142	1.758	.219	-.248
15	1.789	-.018	-.154	2.023	.384	-.231
20	1.948	.148	-.141	2.225	.570	-.219
25	2.062	.344	-.130	2.287	.787	-.242
30	2.099	.528	-.117	2.416	.978	-.206
35	2.062	.679	-.098	2.139	.955	-.140
40	1.974	.806	-.046			
45	1.889	.914	-.026			
50	1.720	.973	0			
55	1.594	1.016	.031			
60	1.061	.953	.115			

(b) Fuselage data

α, deg	$C_{L,s(fus)}$			
	$C_{T,s} = 0.90$	$C_{T,s} = 0.80$	$C_{T,s} = 0.60$	$C_{T,s} = 0.30$
5	-0.049	-0.008	0.055	0.108
10	-.051	-.010	.048	.103
15	-.042	.002	.060	.098
20	-.025	.015	.069	.096
25	-.025	.023	.077	.085
30	-.022	.028	.092	.077
35	-.024	.028	.094	.043
40	-.026	.032	.087	
45	-.028	.031	.075	
50	-.029	.042	.063	
55	-.028	------	.038	
60	-.029	.019	.026	
65	-.028	-.010		
70	-.041	-.005		
75	-.039	.013		
80	-.036			

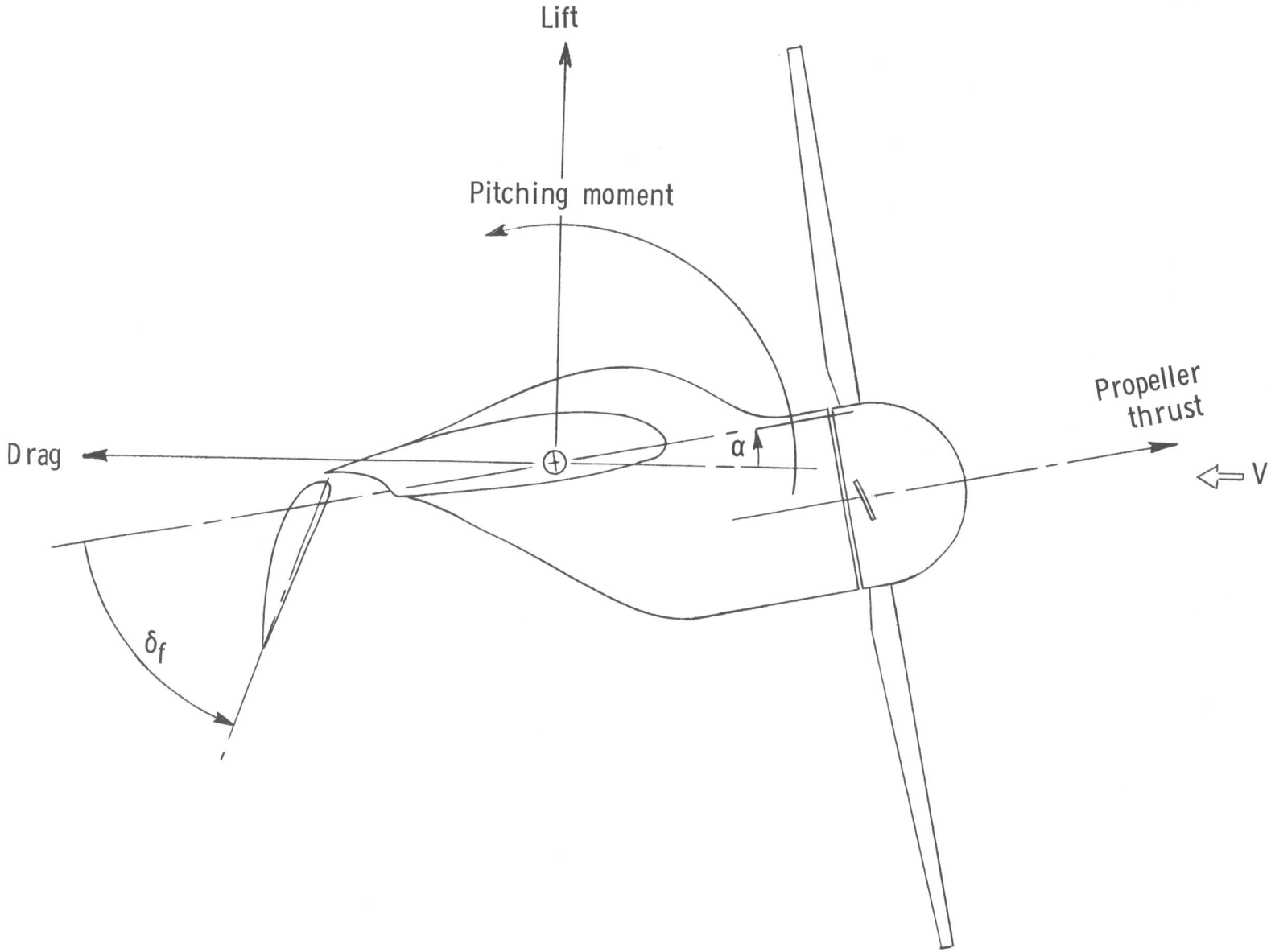
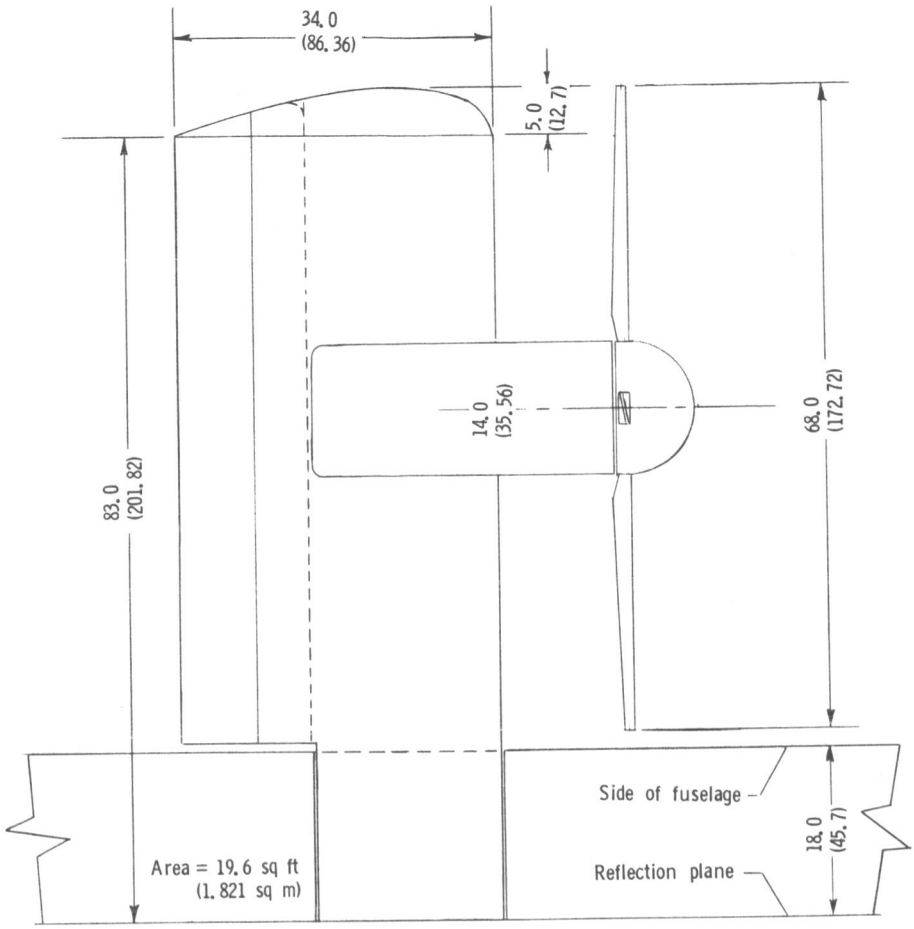
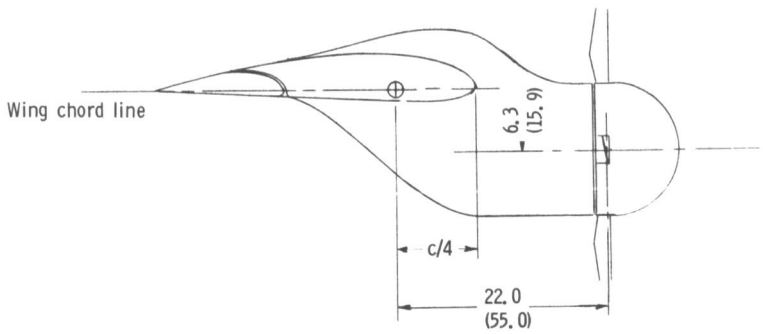


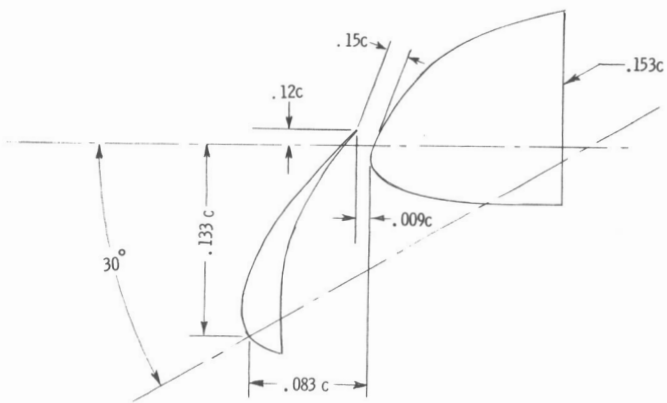
Figure 1.- The positive sense of forces, moments, and angles.



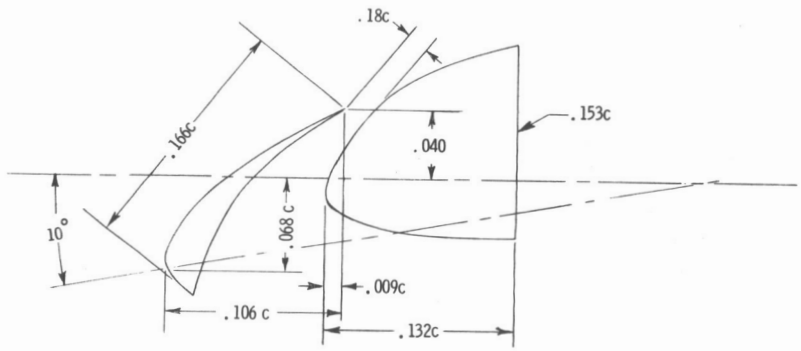


(a) Principal dimensions in inches; numbers in parentheses are centimeters.

Figure 2.- Principal dimensions and cross-sectional views of the model.



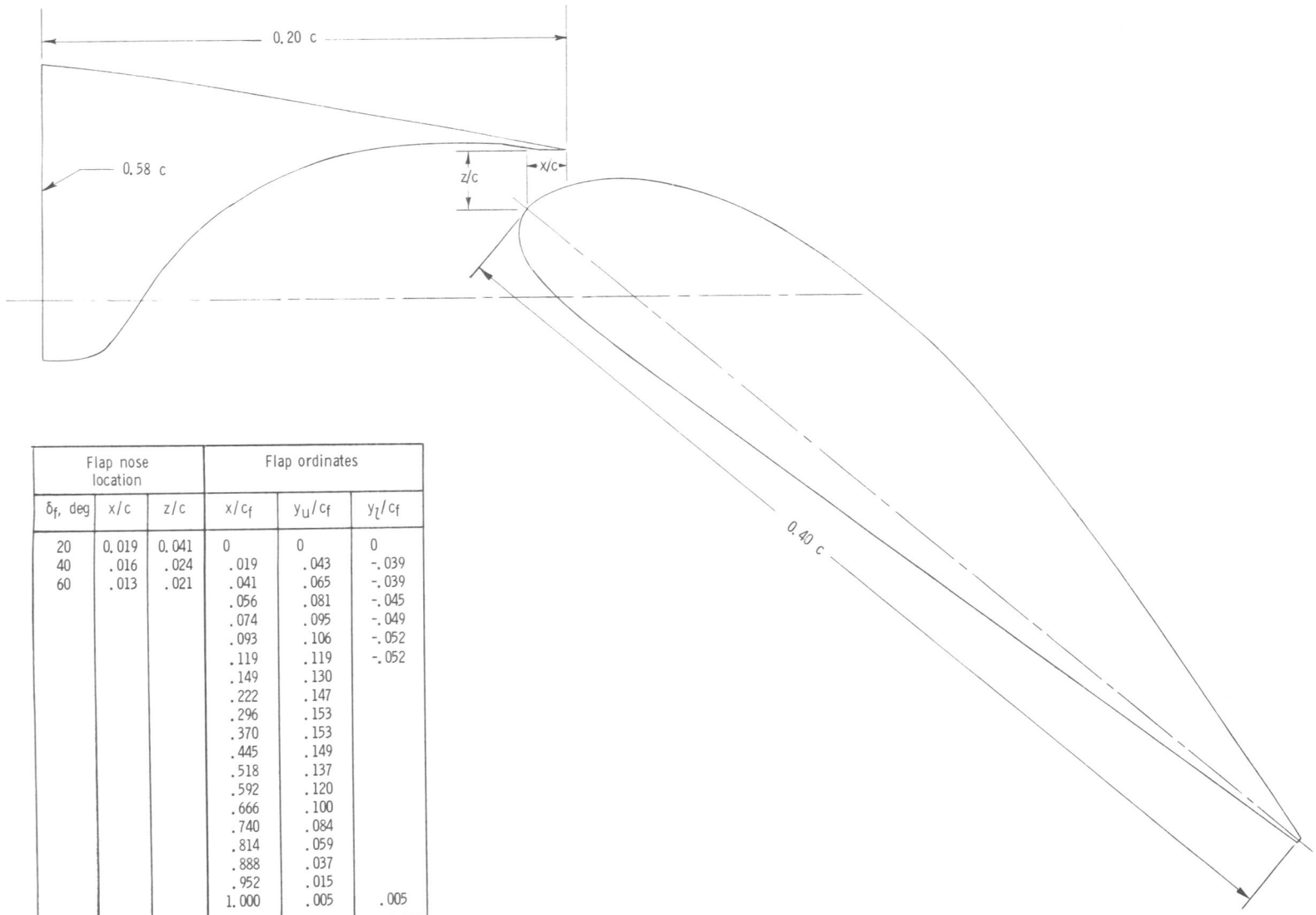
Leading-edge-slat position



Slat position over fuselage

(b) Sectional views of leading-edge-slat configuration.

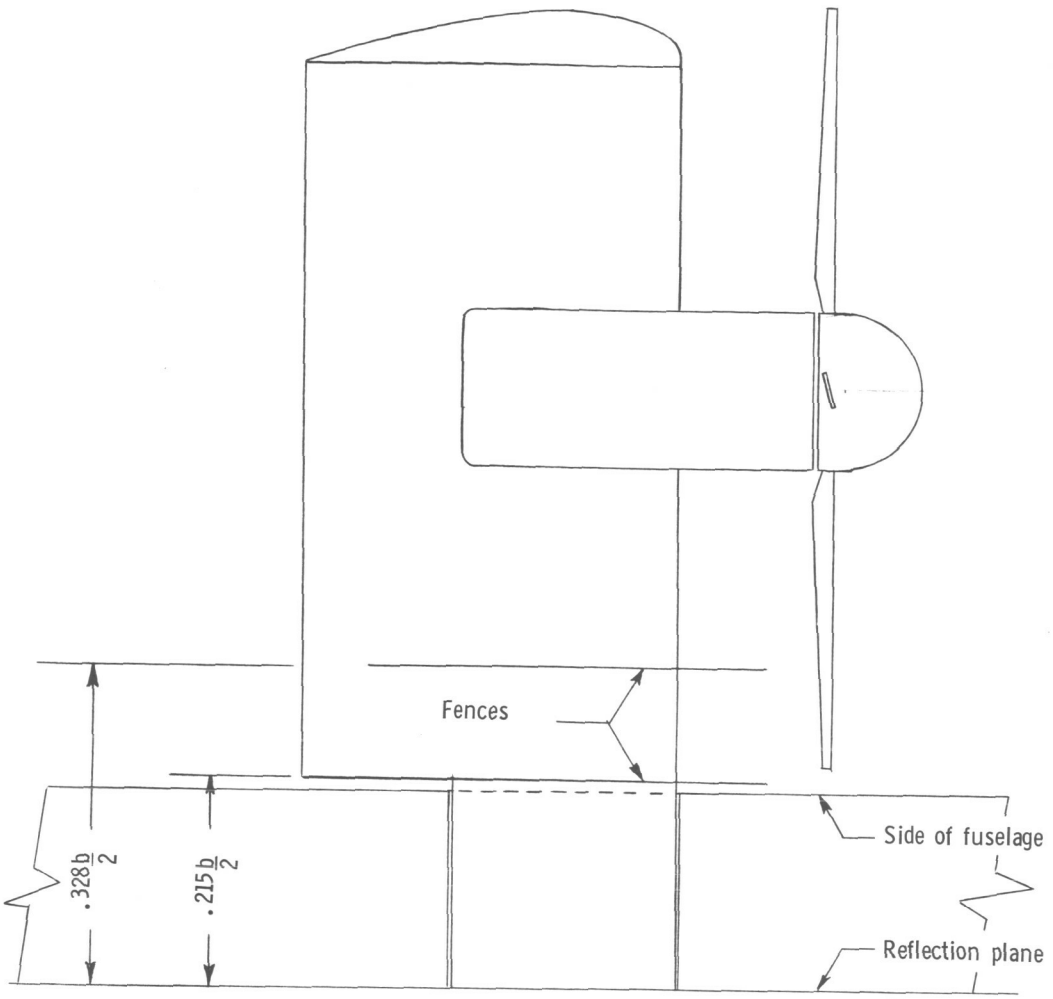
Figure 2.- Continued.

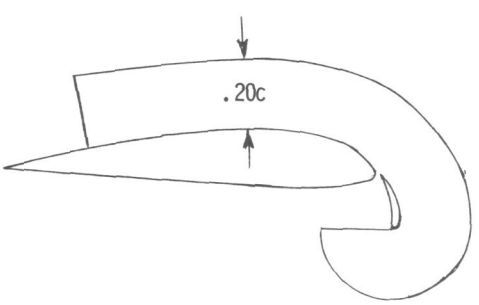


Flap nose location			Flap ordinates		
δ_f, deg	x/c	z/c	x/c_f	y_U/c_f	y_l/c_f
20	0.019	0.041	0	0	0
40	.016	.024	.019	.043	-.039
60	.013	.021	.041	.065	-.039
			.056	.081	-.045
			.074	.095	-.049
			.093	.106	-.052
			.119	.119	-.052
			.149	.130	
			.222	.147	
			.296	.153	
			.370	.153	
			.445	.149	
			.518	.137	
			.592	.120	
			.666	.100	
			.740	.084	
			.814	.059	
			.888	.037	
			.952	.015	
			1.000	.005	.005

(c) Sectional view of trailing-edge flap.

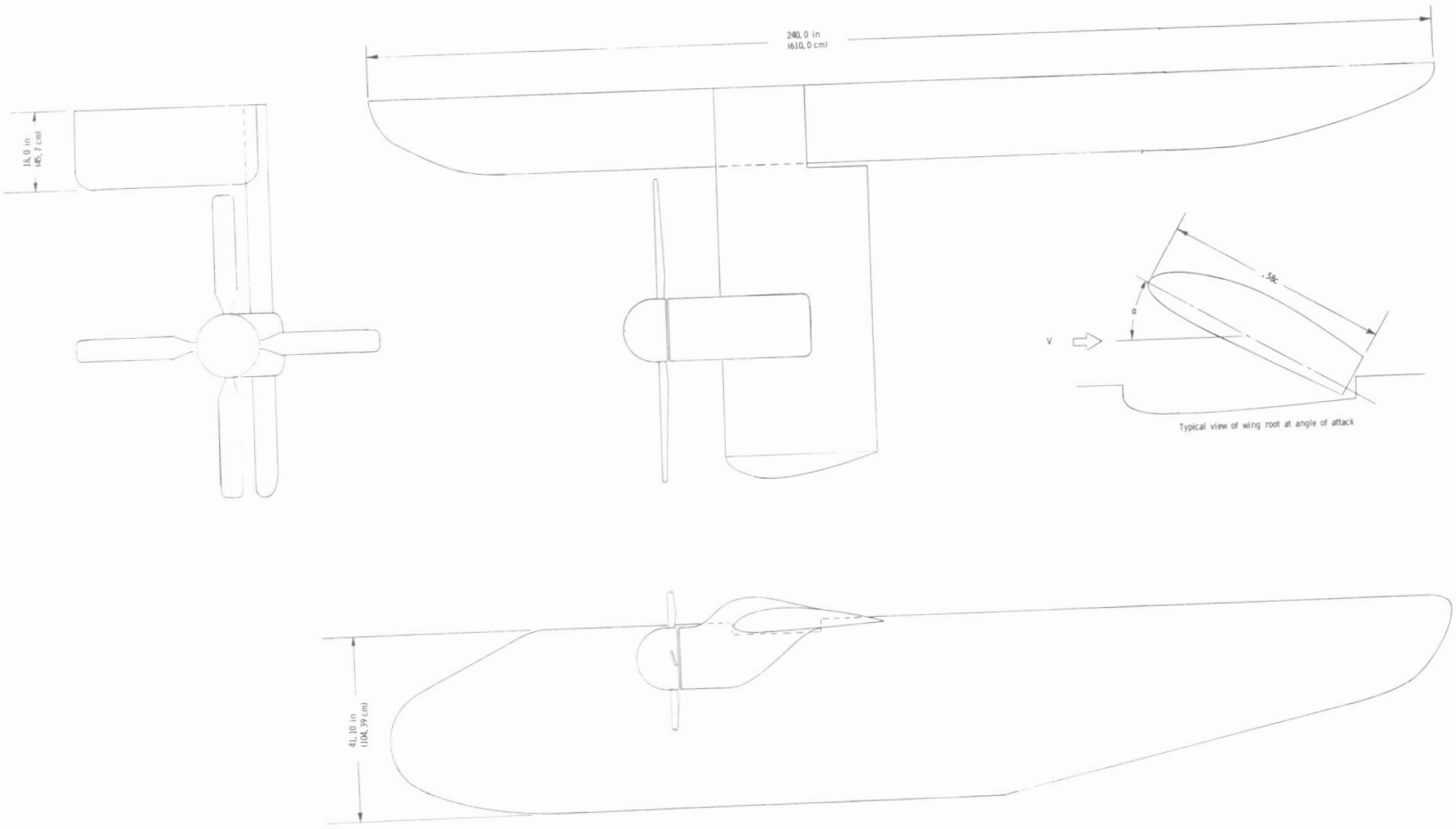
Figure 2.- Continued.





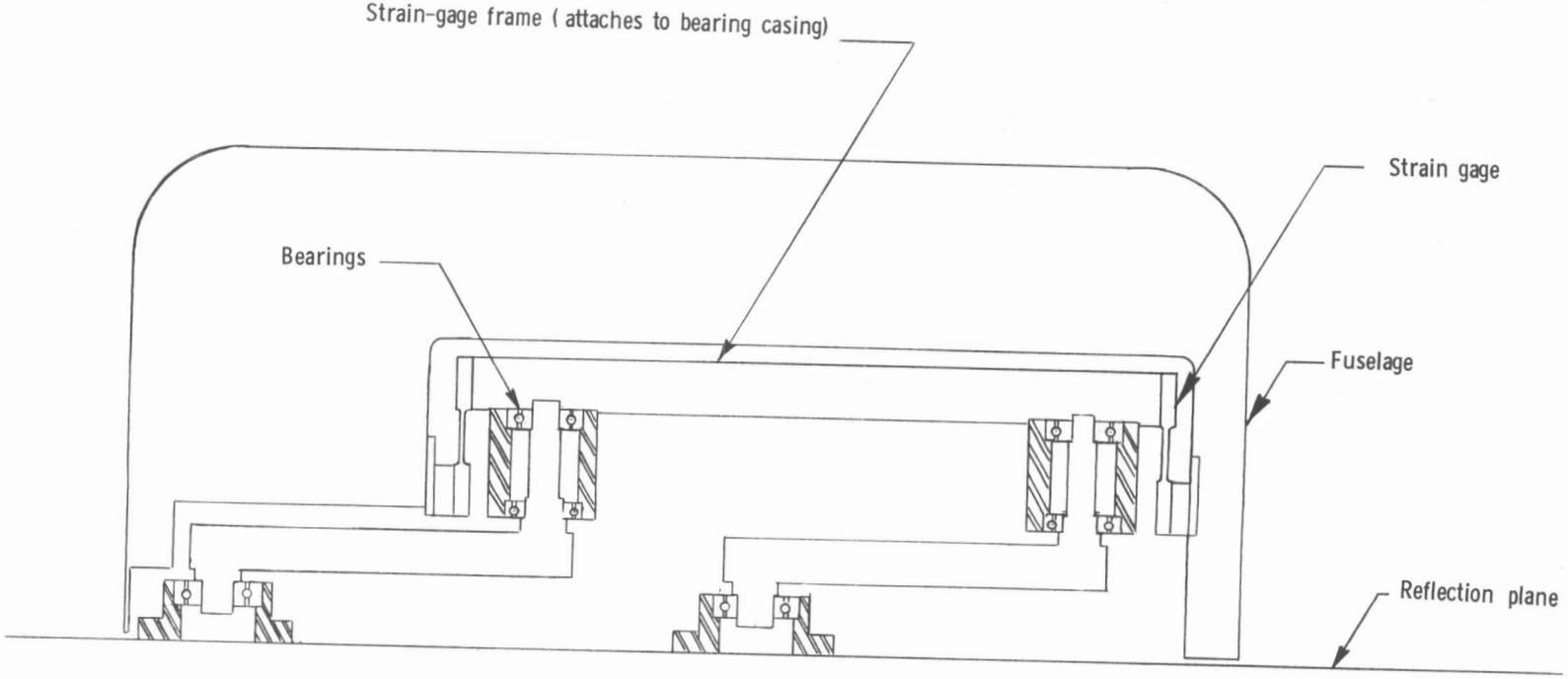
(d) Sectional view and location of fences.

Figure 2.- Concluded.



(a) Three-view drawing of the wing and fuselage.

Figure 3.- Three-view drawing of the wing and fuselage and a cross section of the fuselage showing the strain-gage setup.



(b) Cross section of fuselage showing strain-gage setup.

Figure 3.- Concluded.

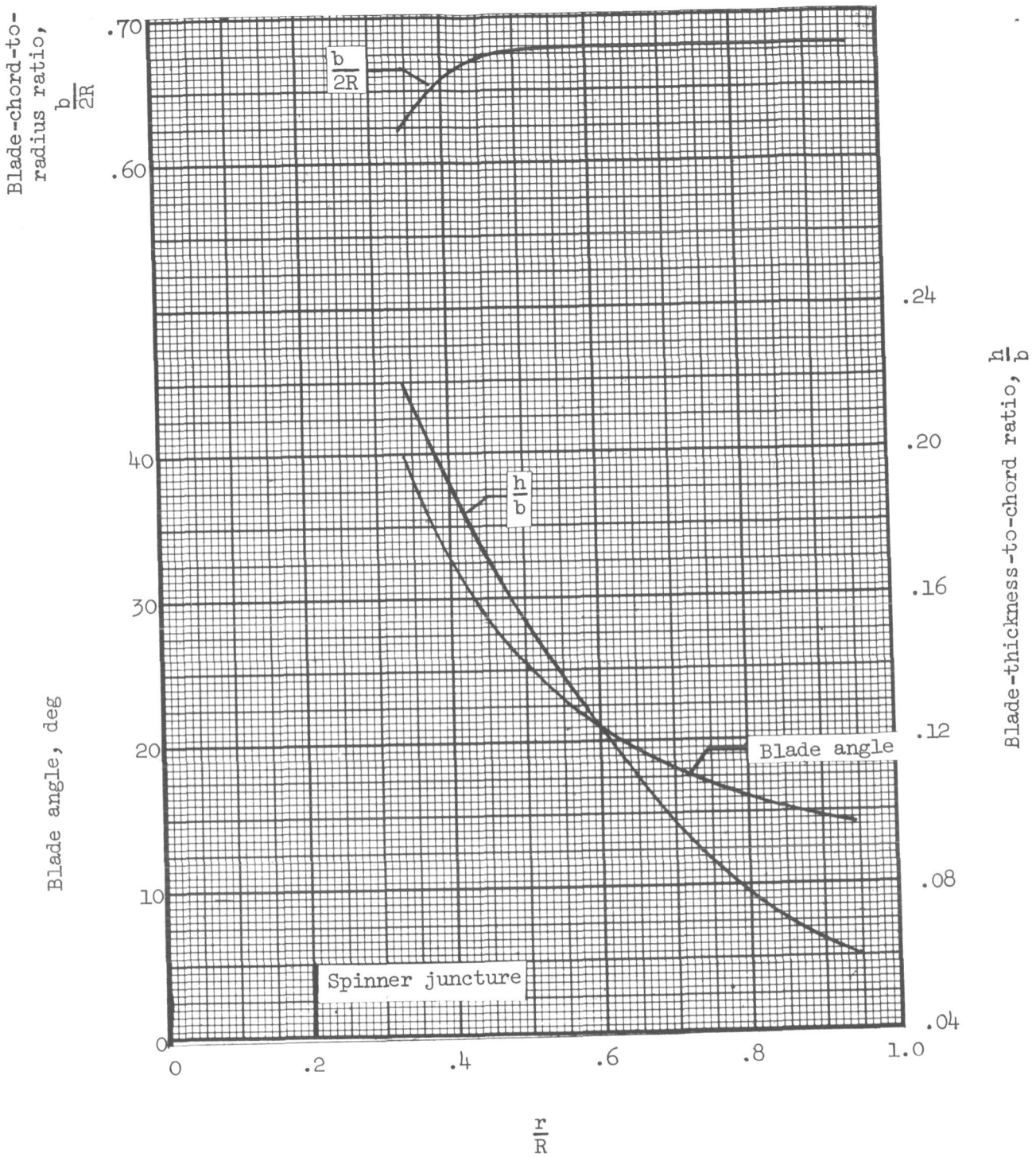


Figure 4.- Propeller blade-form curves.

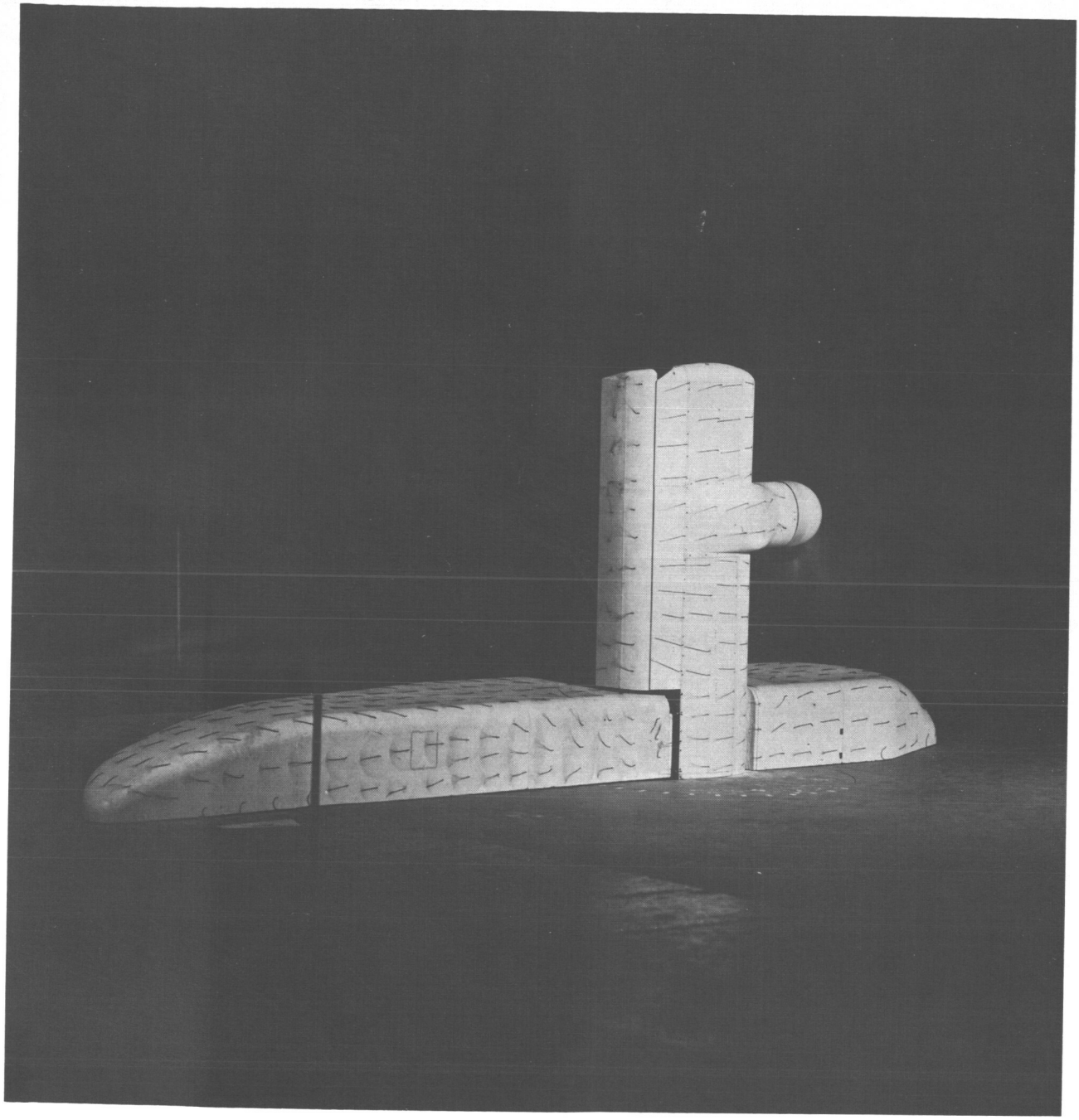
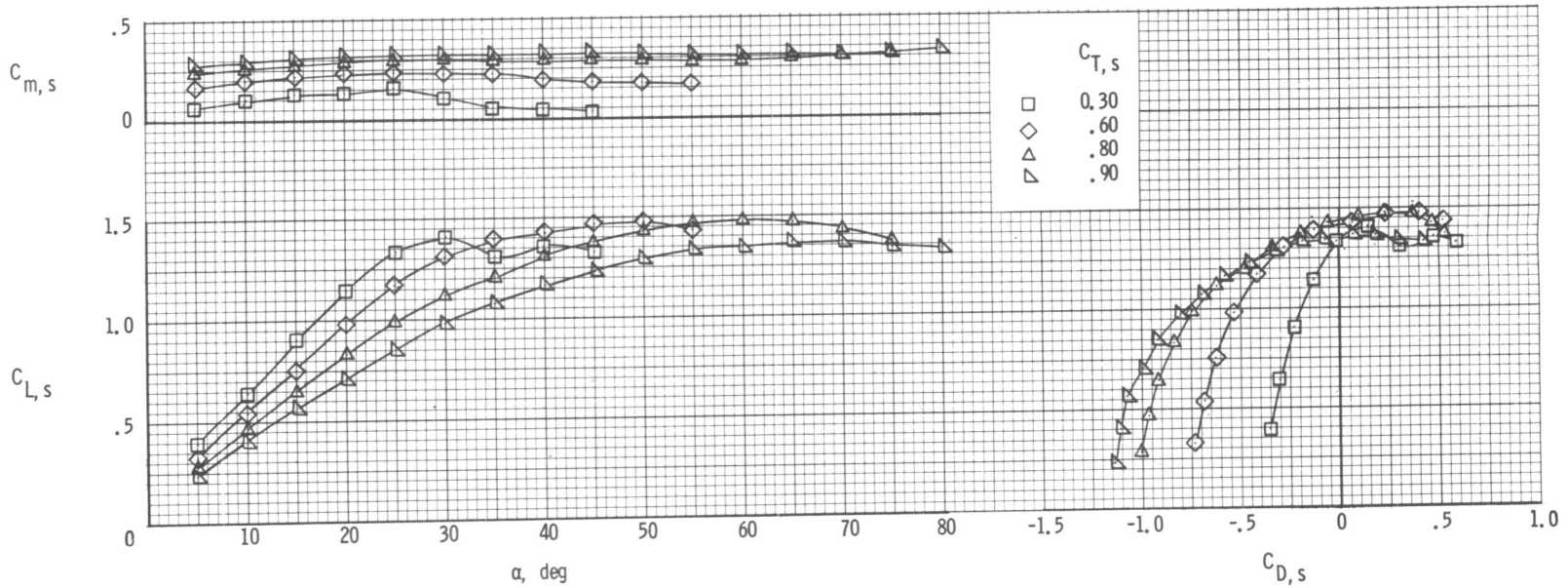
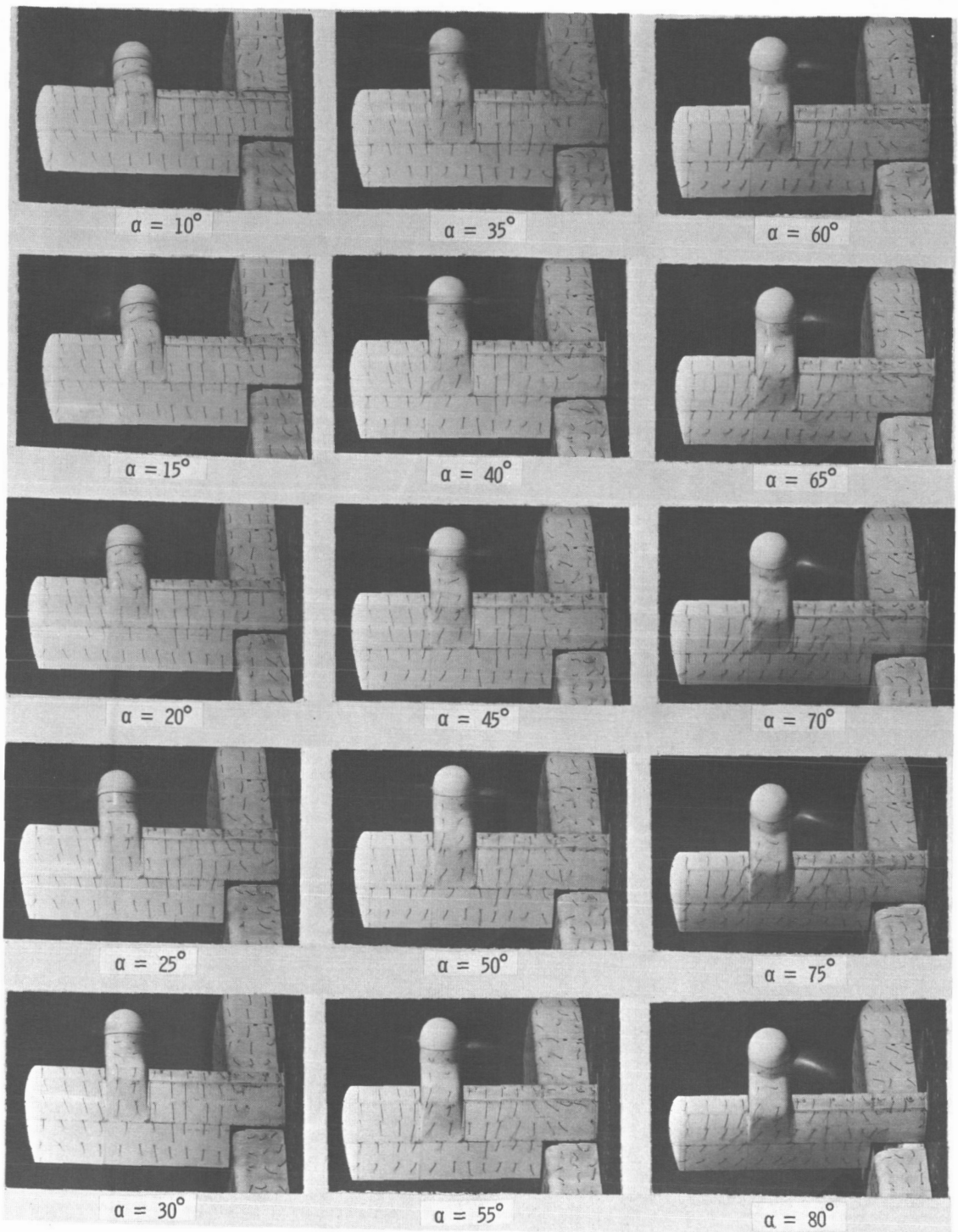


Figure 5.- Photograph of model.



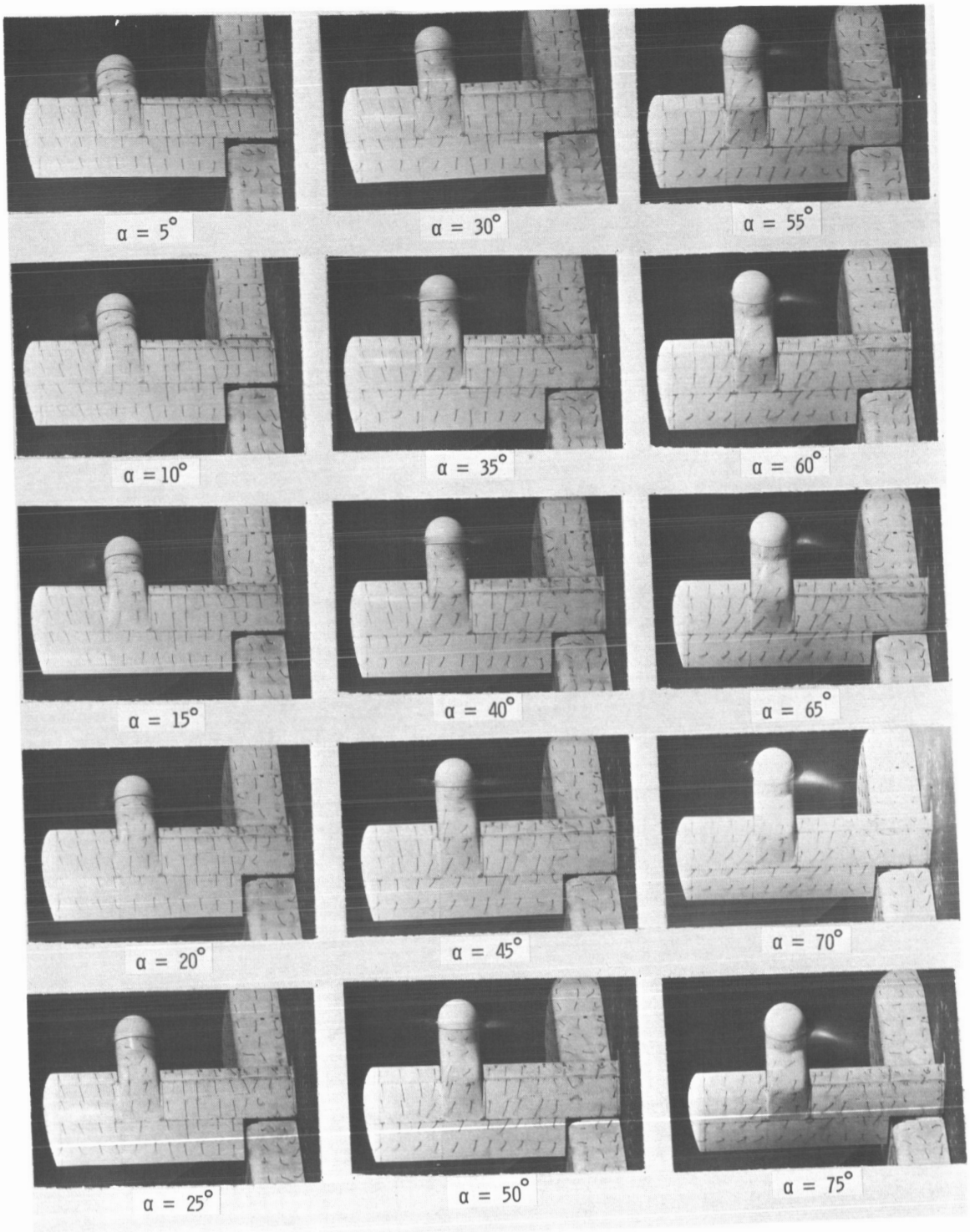
(a) Aerodynamic characteristics.

Figure 6.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, and $\delta_f = 0^o$.



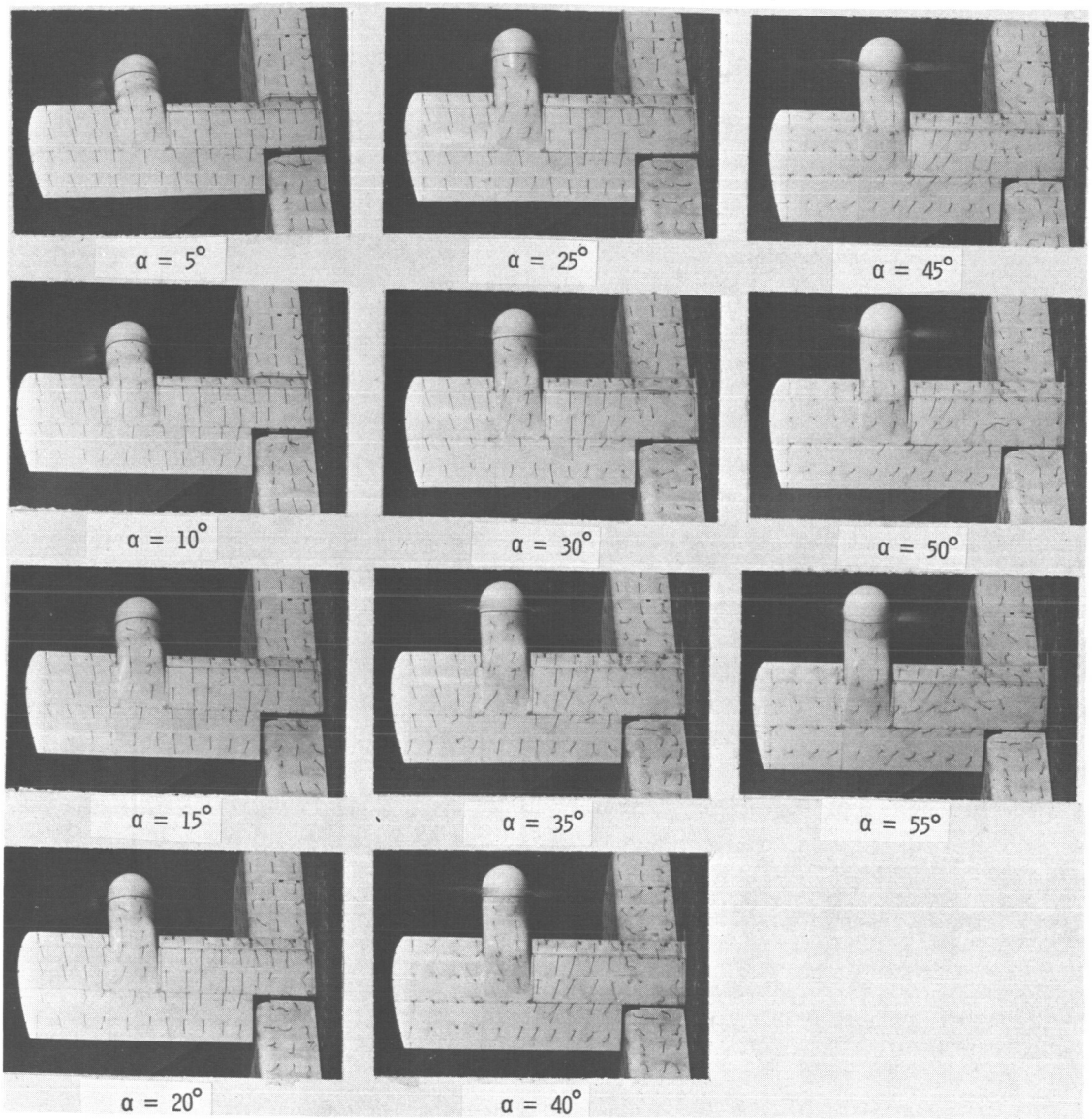
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 6.- Continued.



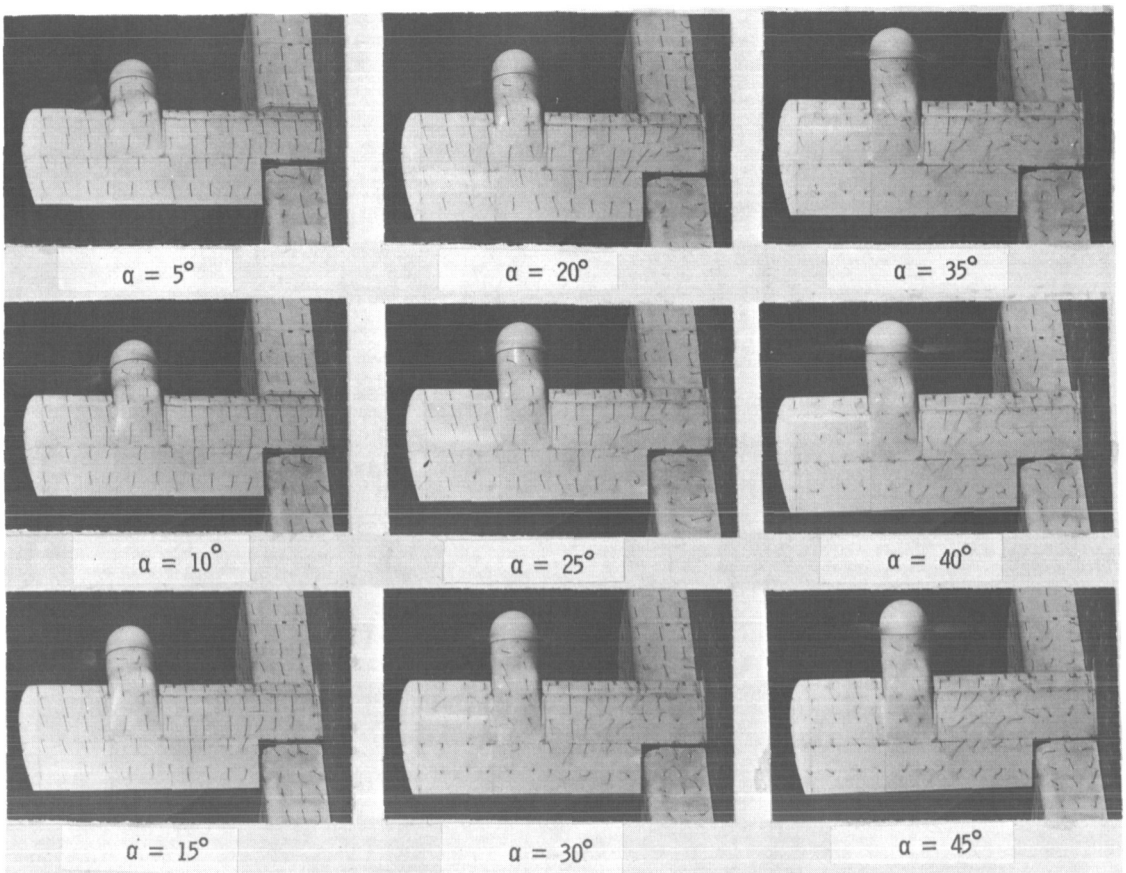
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 6.- Continued.



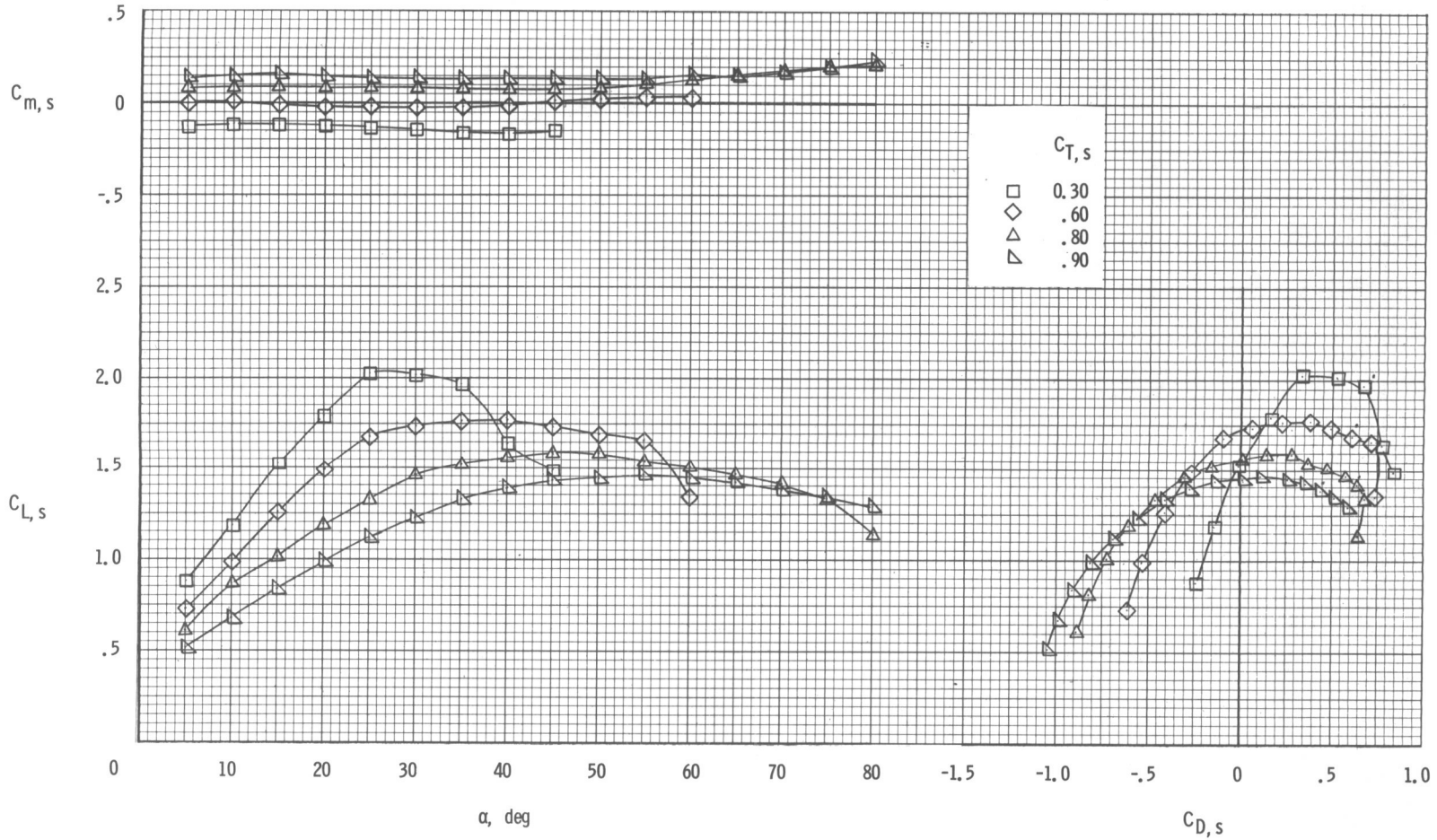
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 6.- Continued.



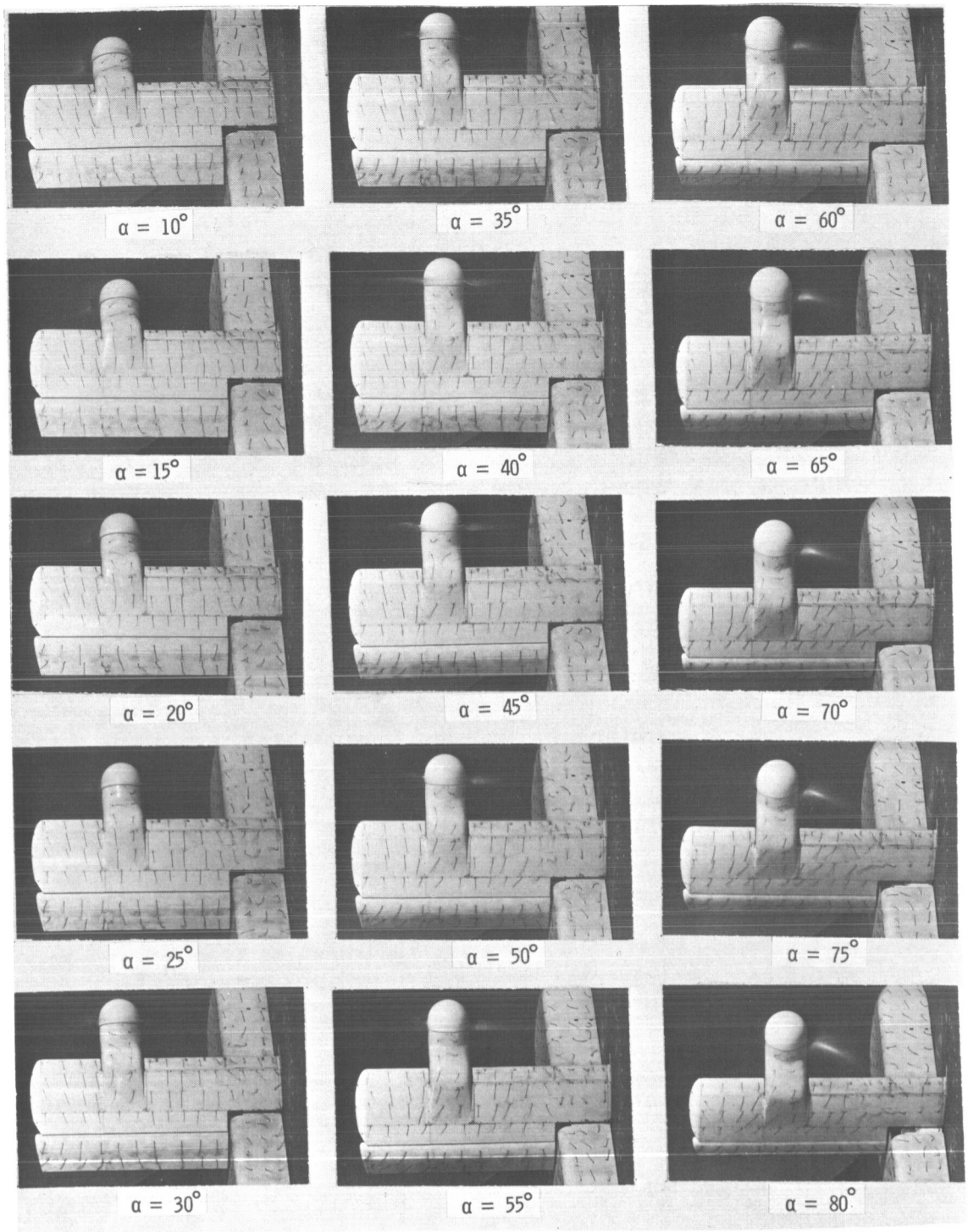
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 6.- Concluded.



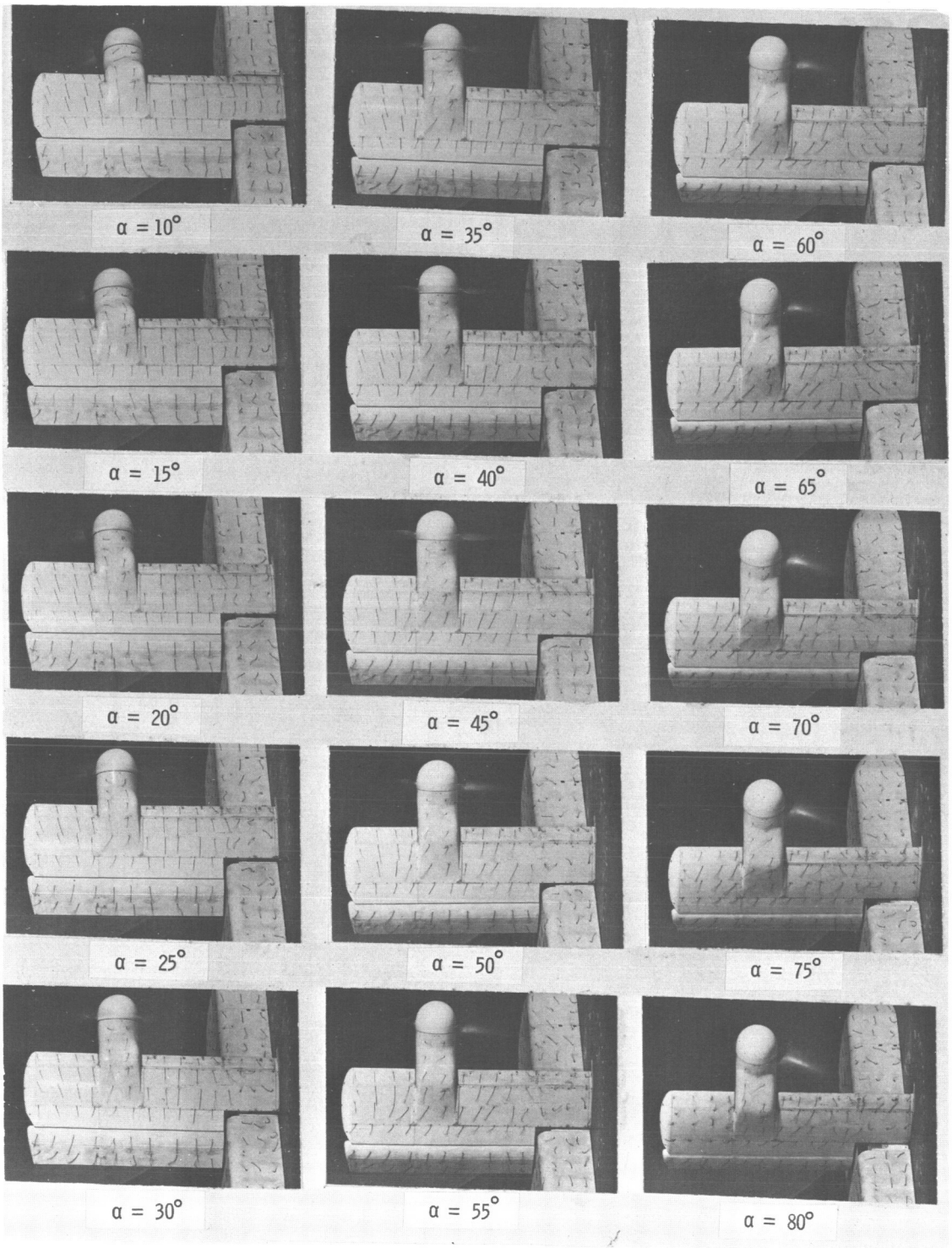
(a) Aerodynamic characteristics.

Figure 7.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, and $\delta_f = 20^o$.



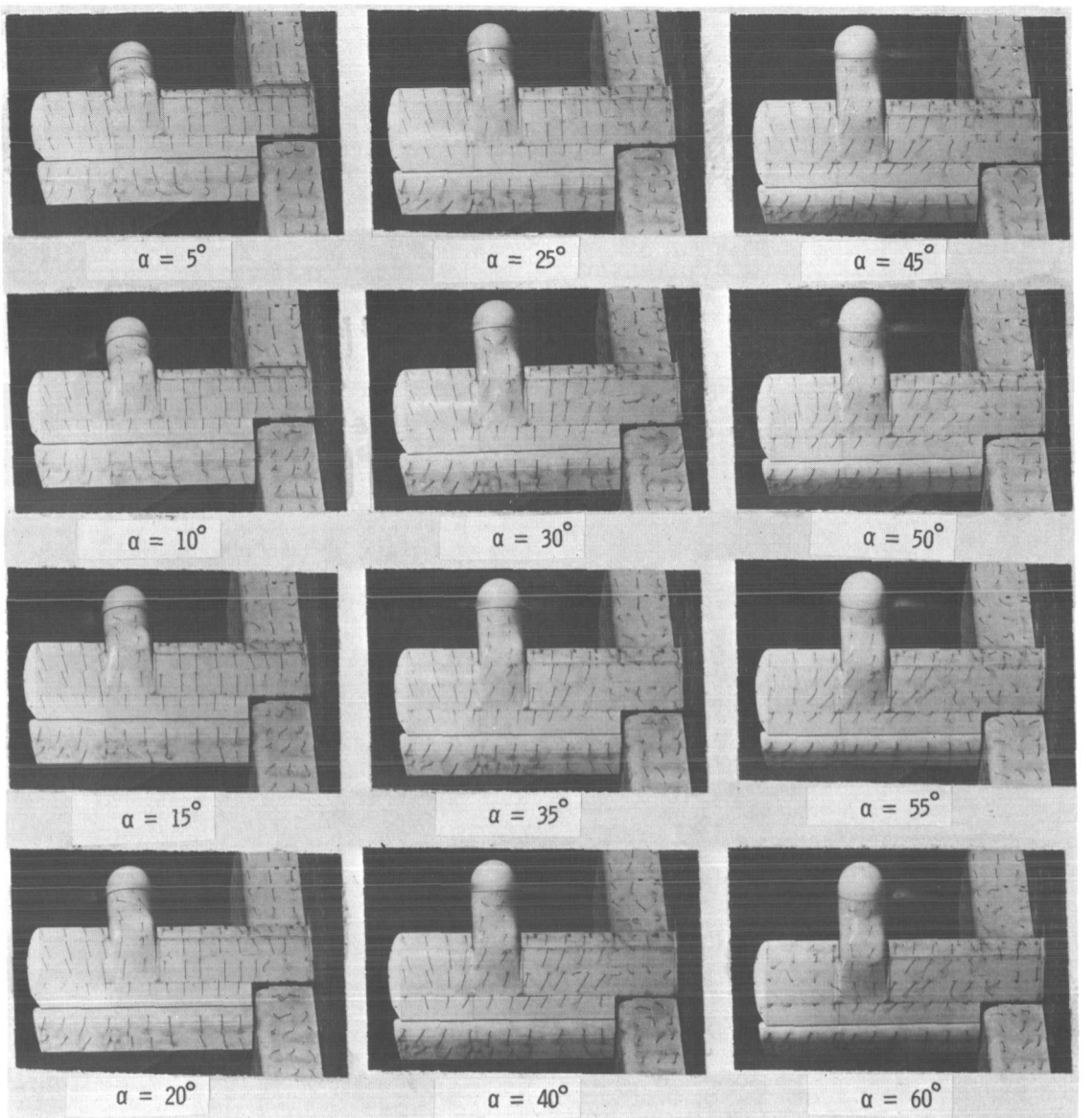
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 7.- Continued.



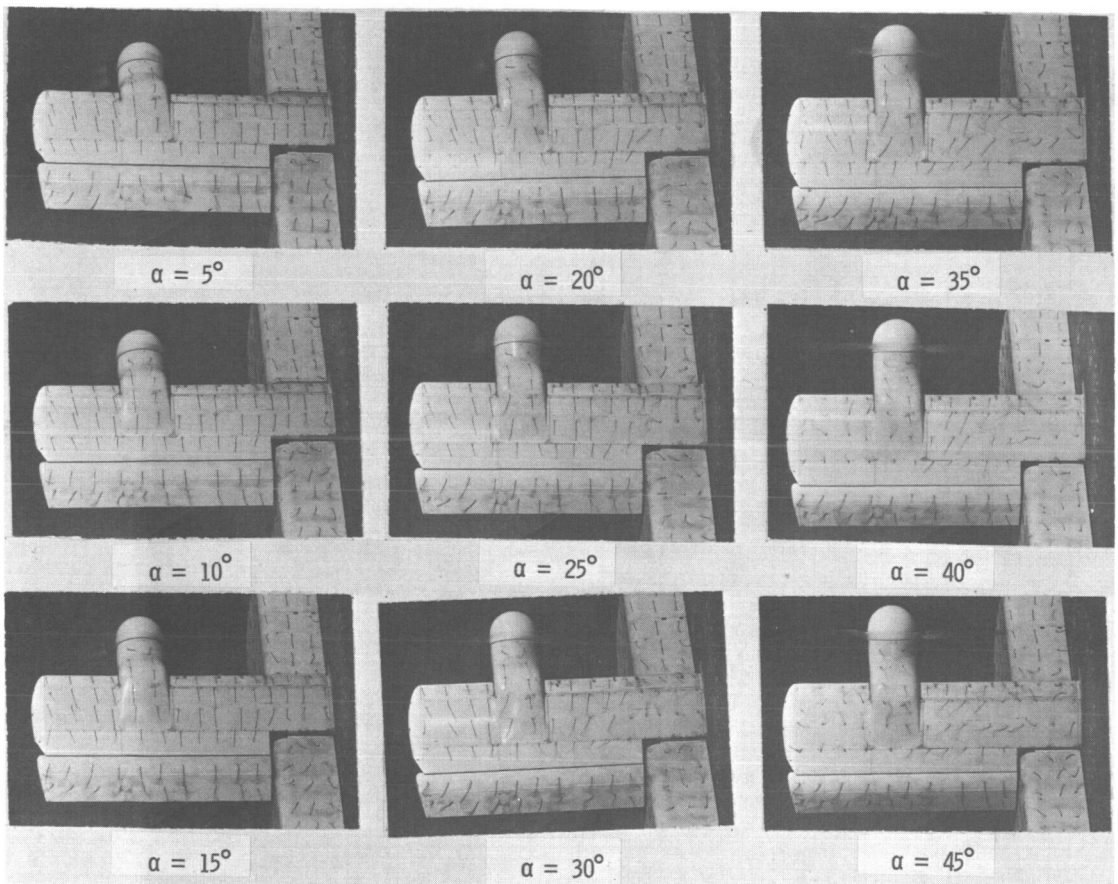
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 7.- Continued.



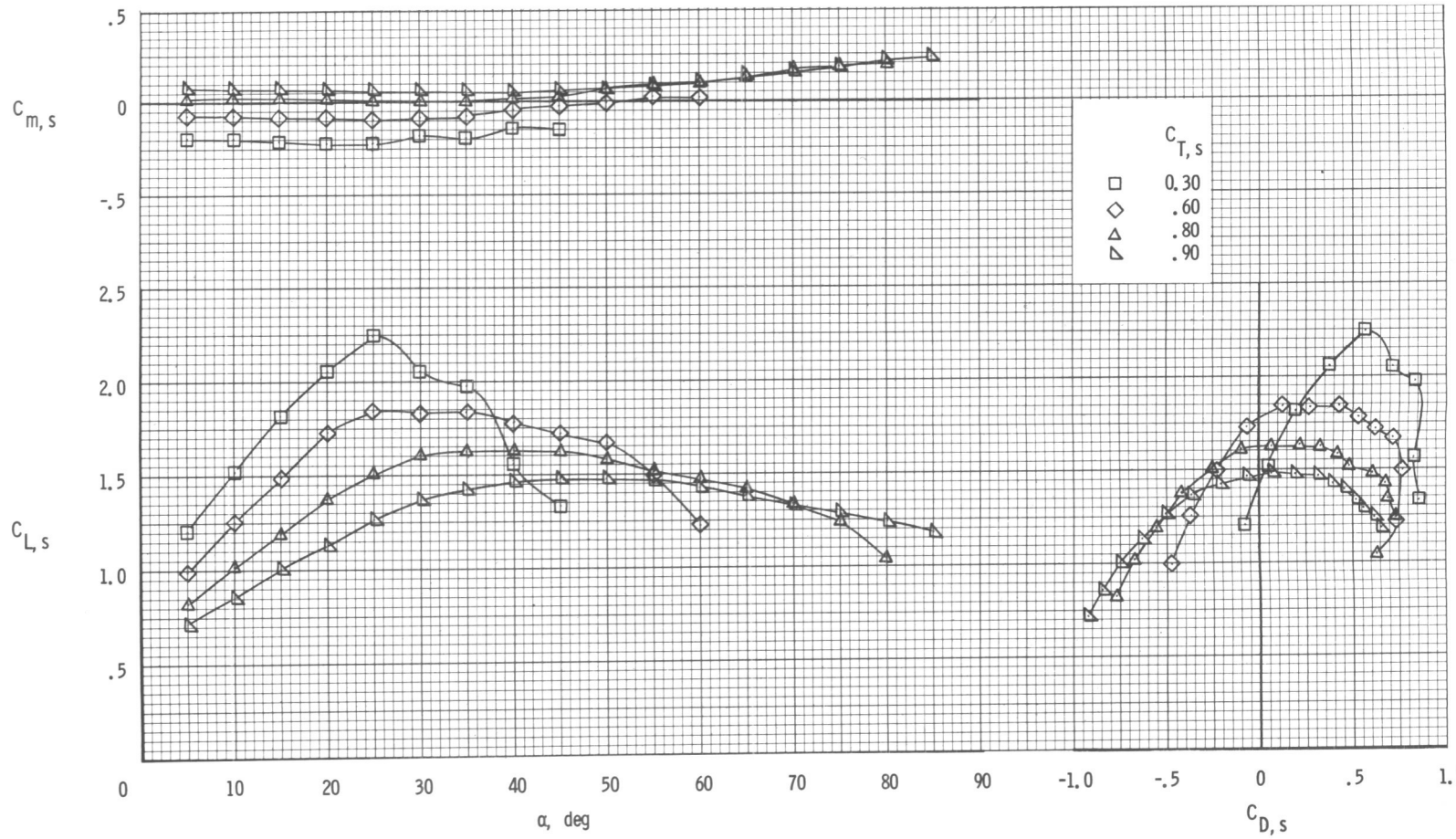
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 7.- Continued.



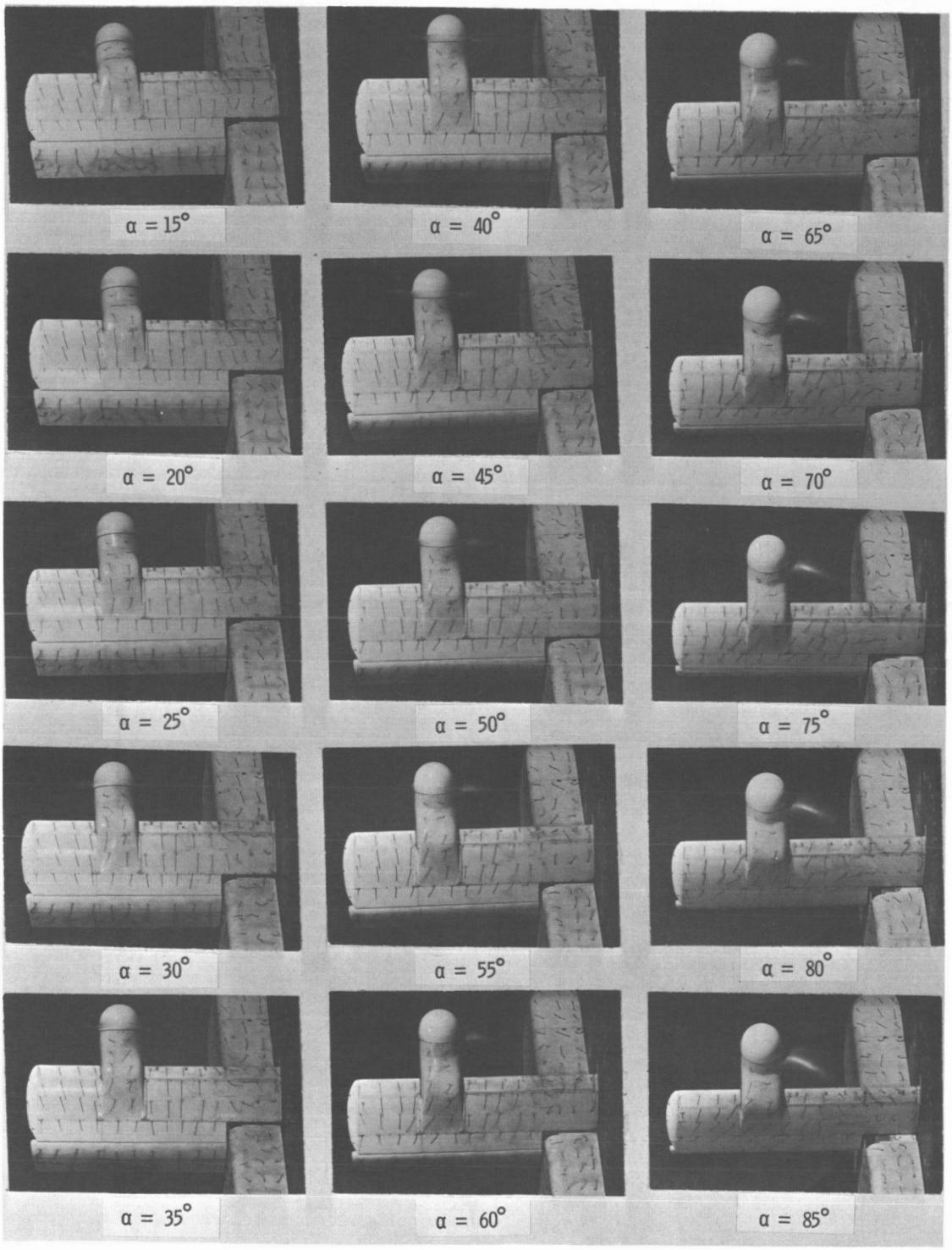
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 7.- Concluded.



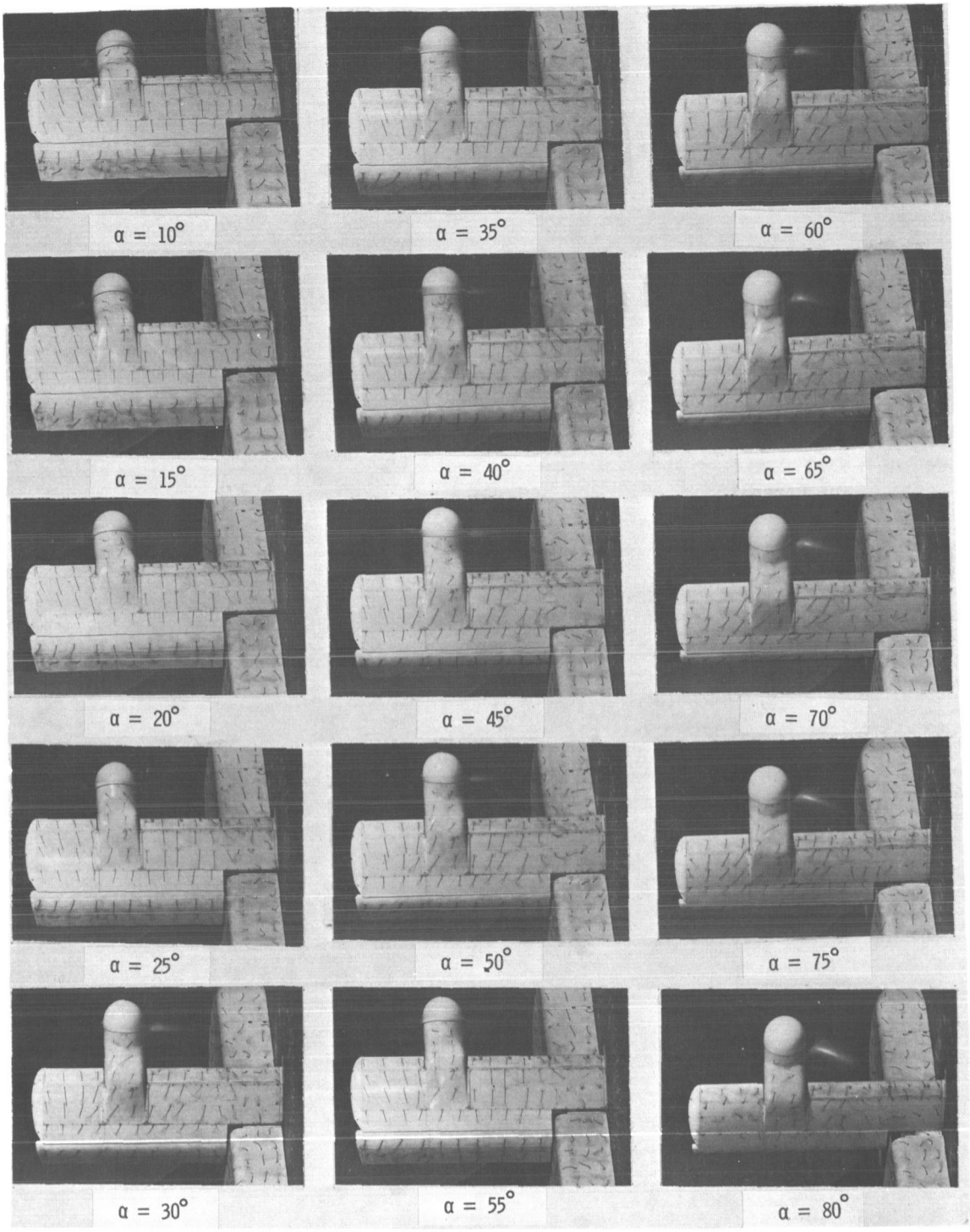
(a) Aerodynamic characteristics.

Figure 8.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, and $\delta_f = 40^o$.



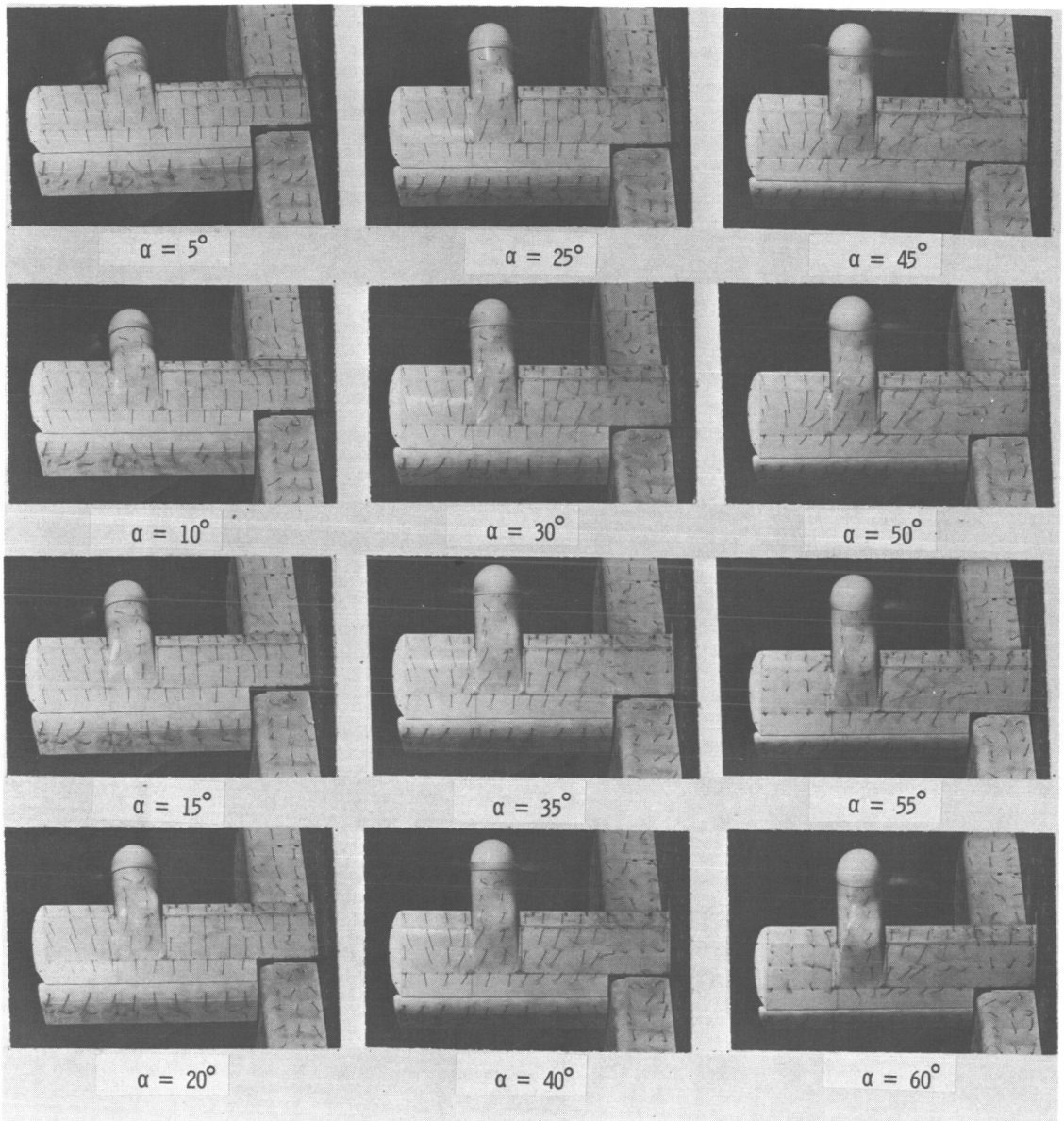
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 8.- Continued.



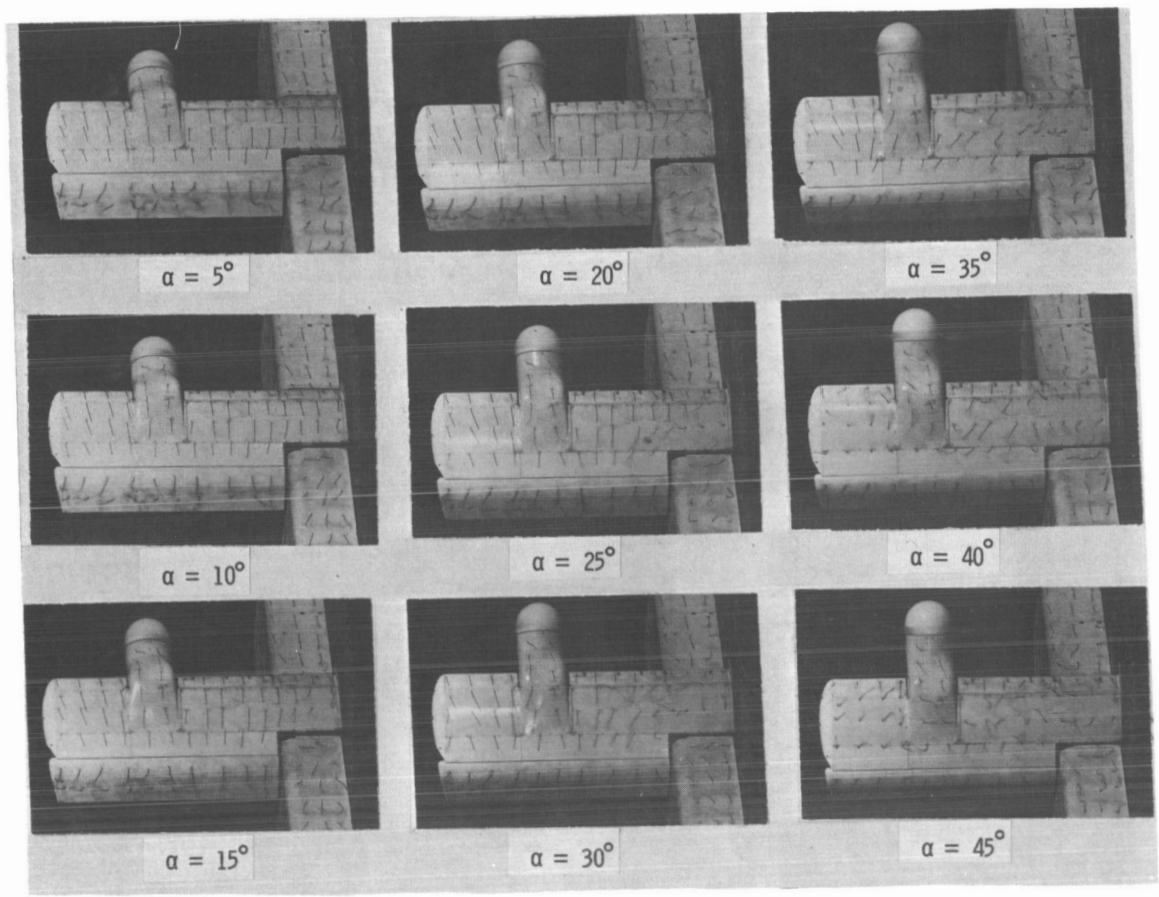
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 8.- Continued.



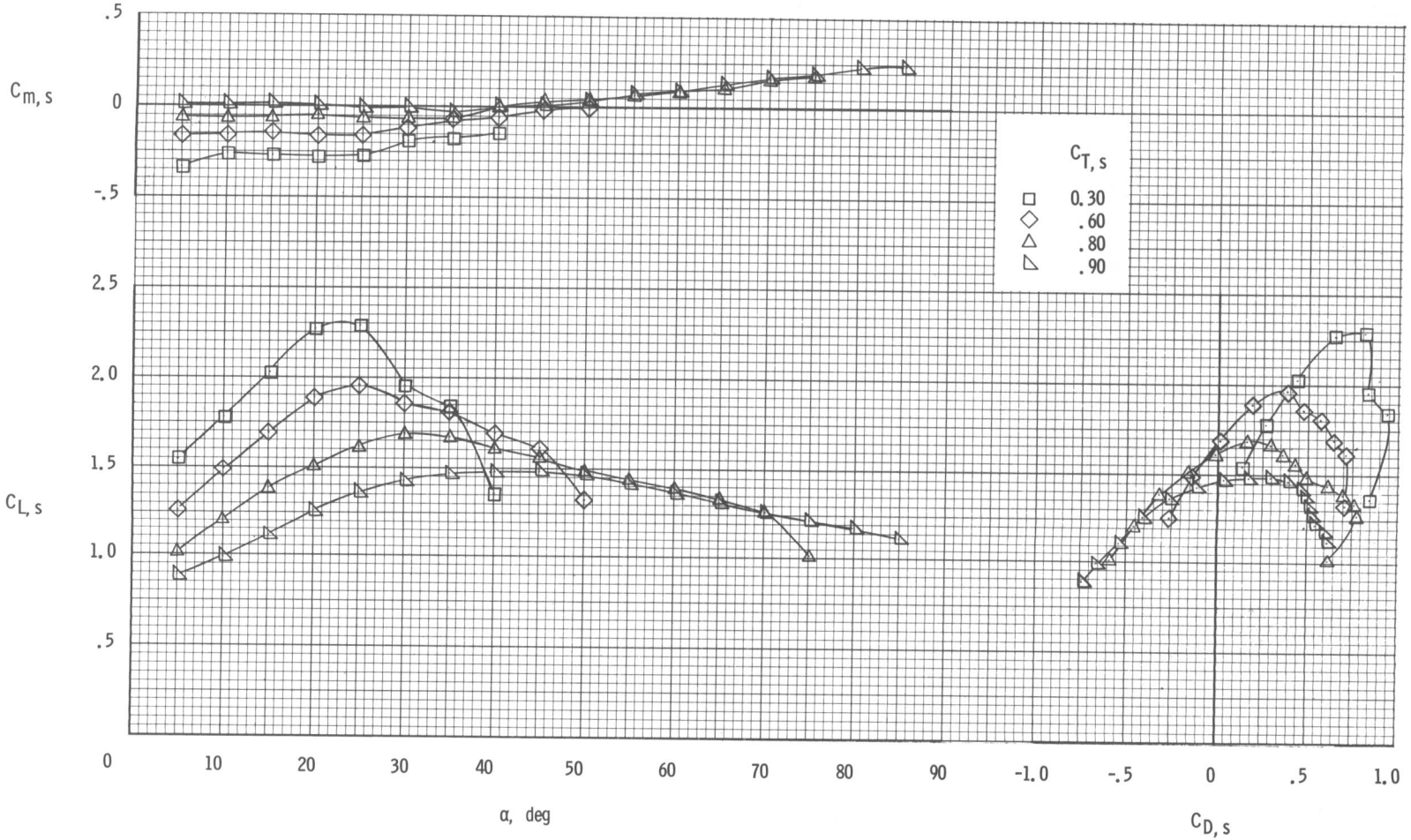
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 8.- Continued.



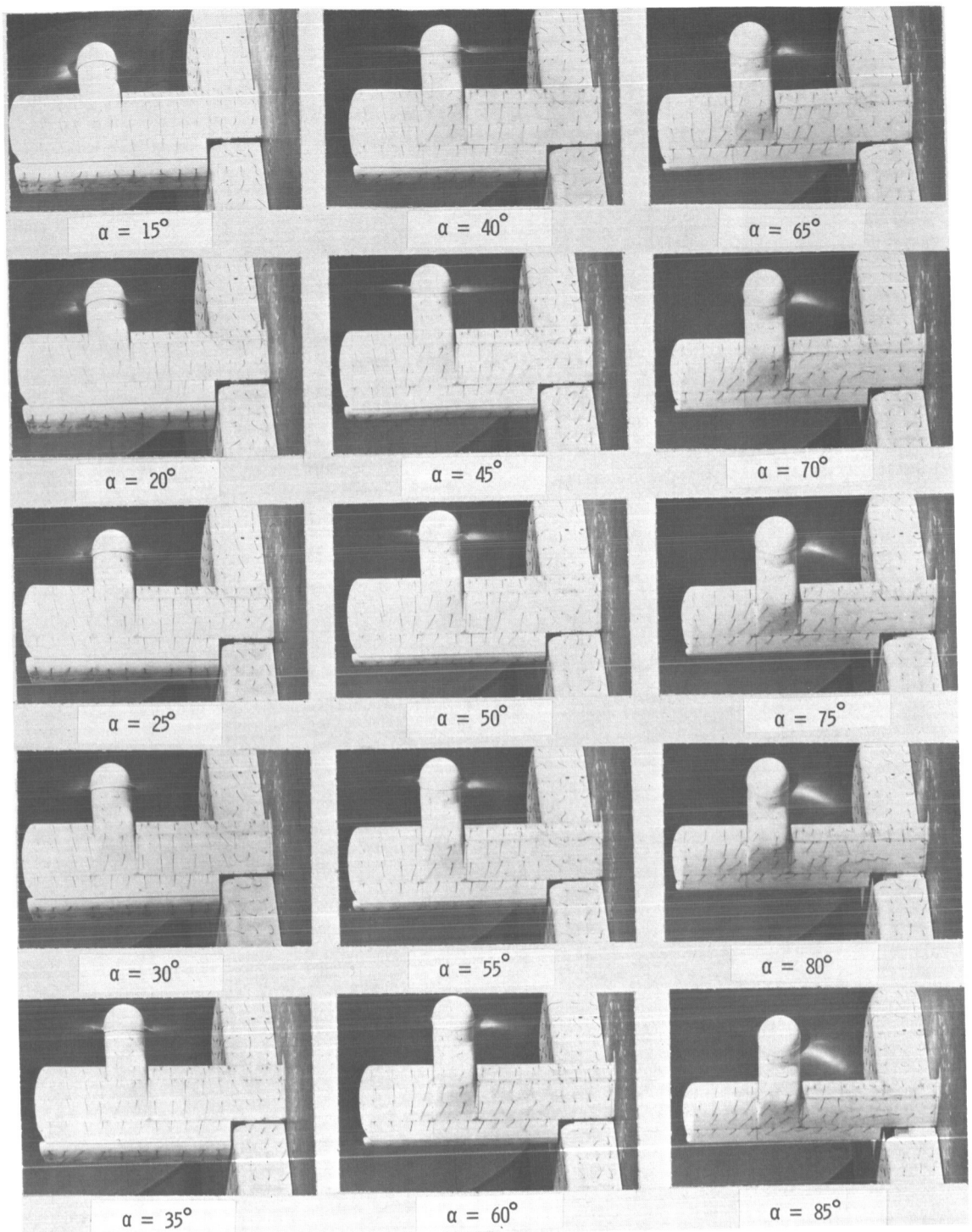
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 8.- Concluded.



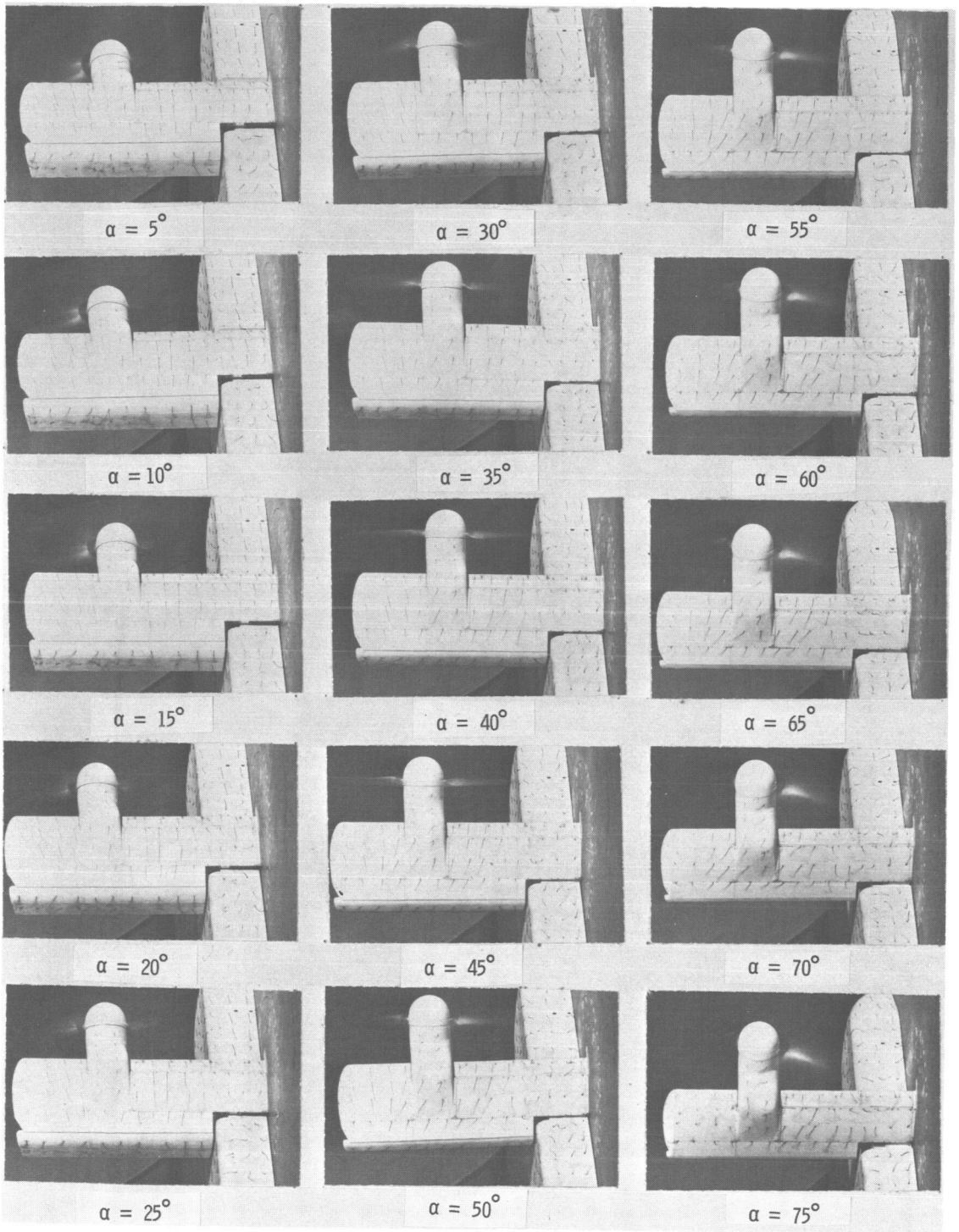
(a) Aerodynamic characteristics.

Figure 9.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, and $\delta_f = 60^0$.



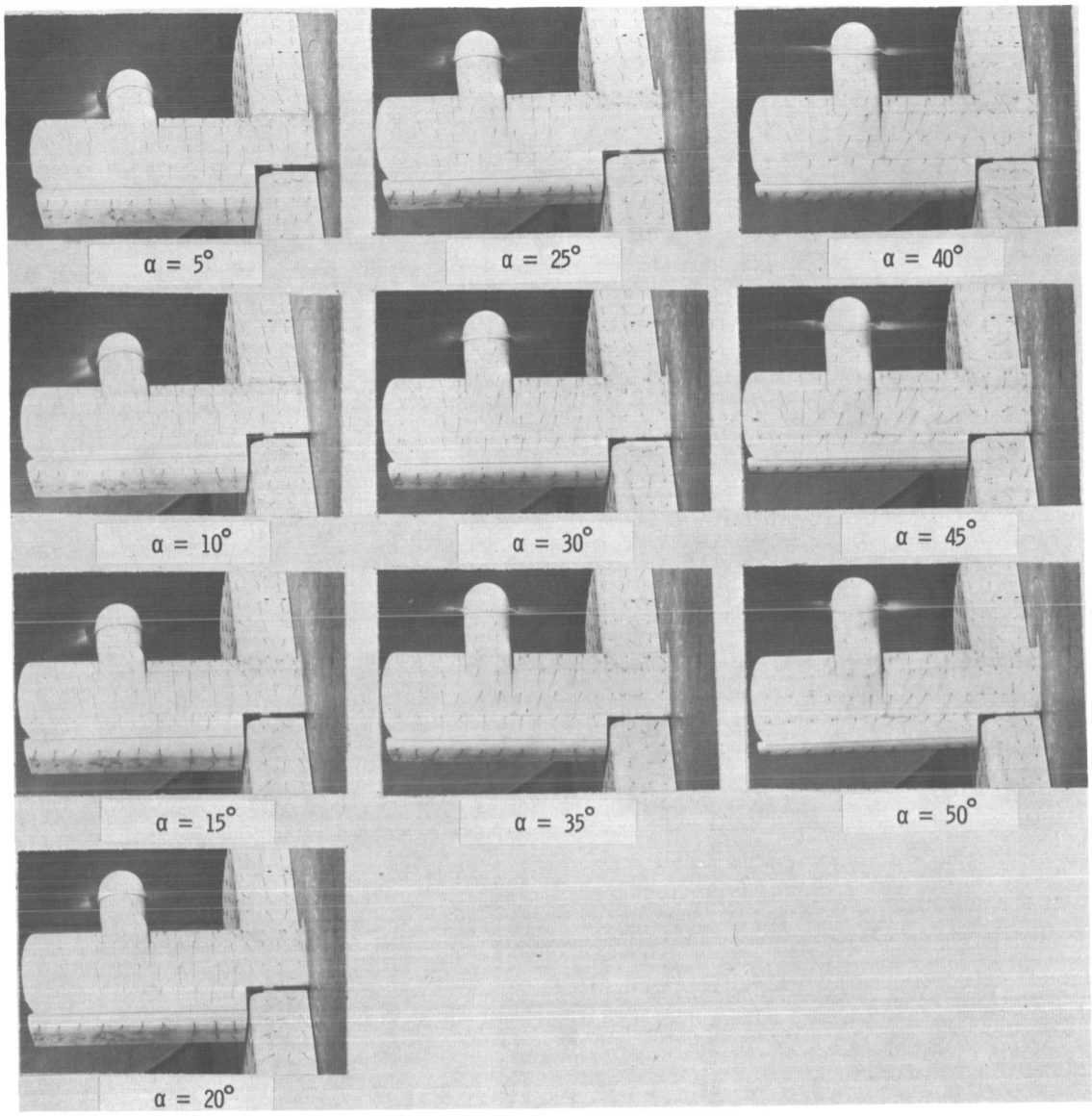
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 9.- Continued.



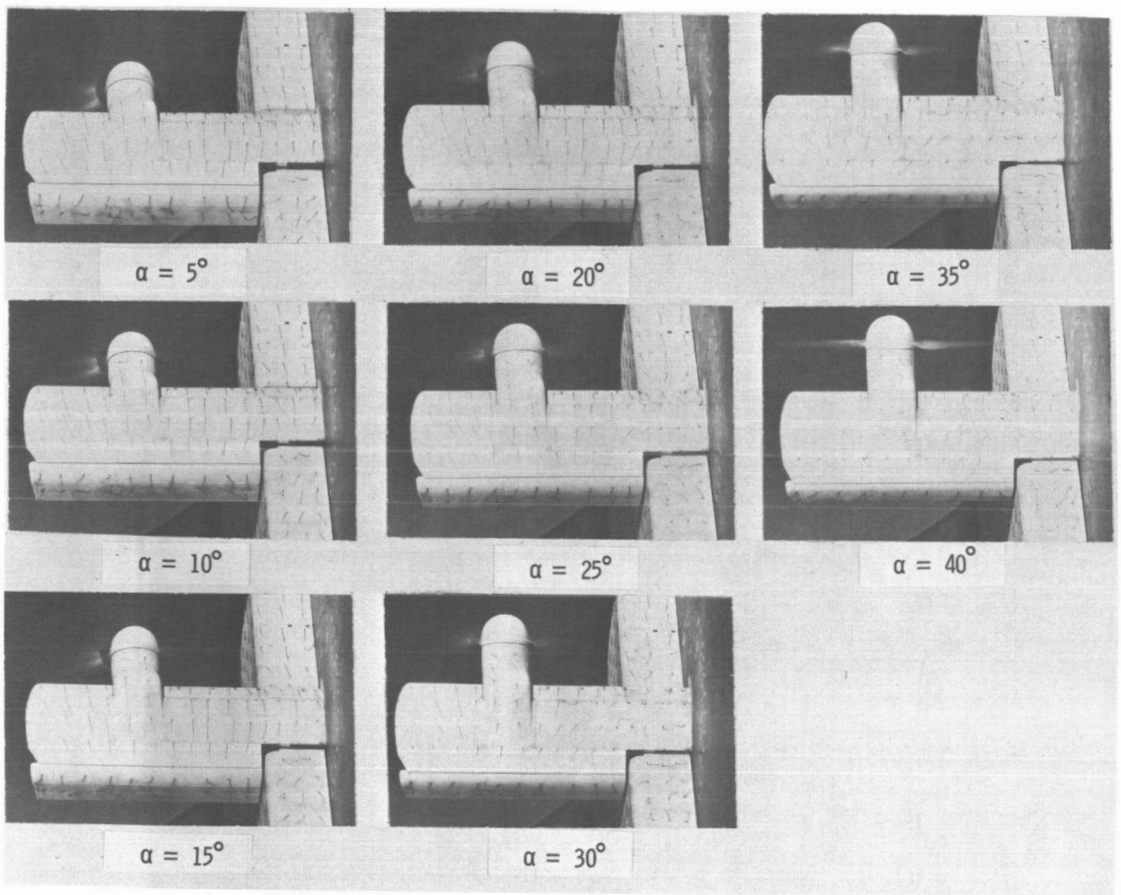
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 9.- Continued.



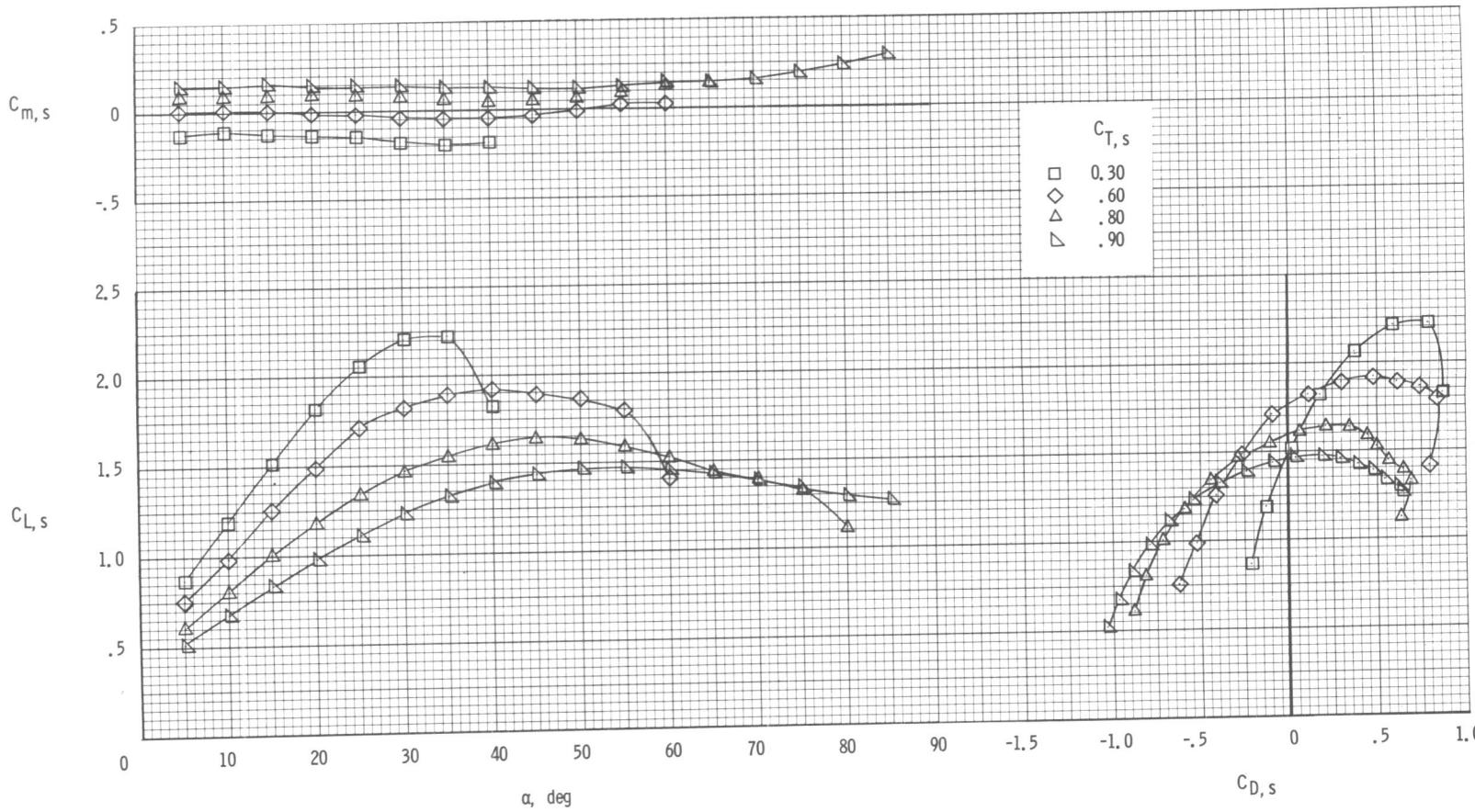
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 9.- Continued.



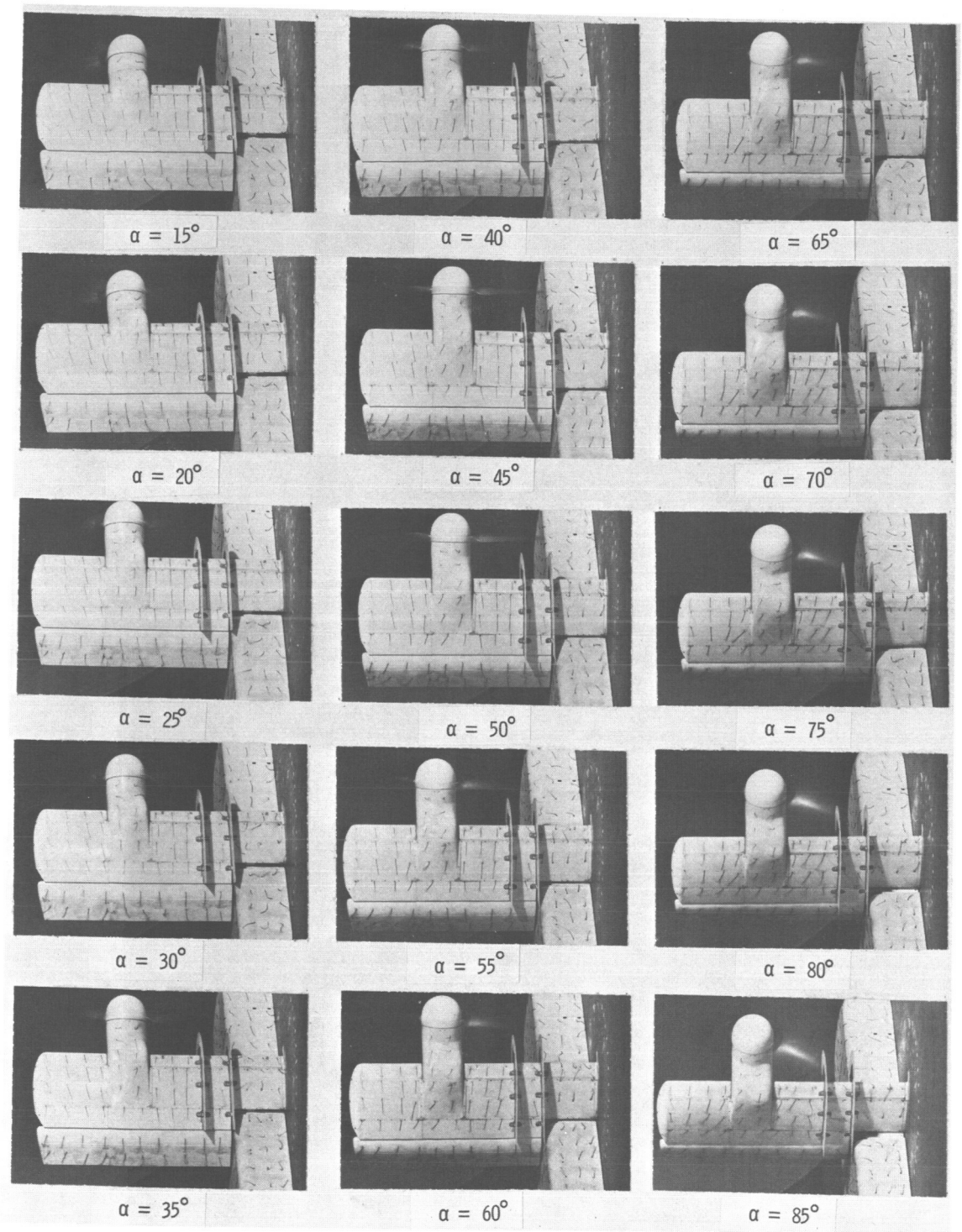
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 9.- Concluded.



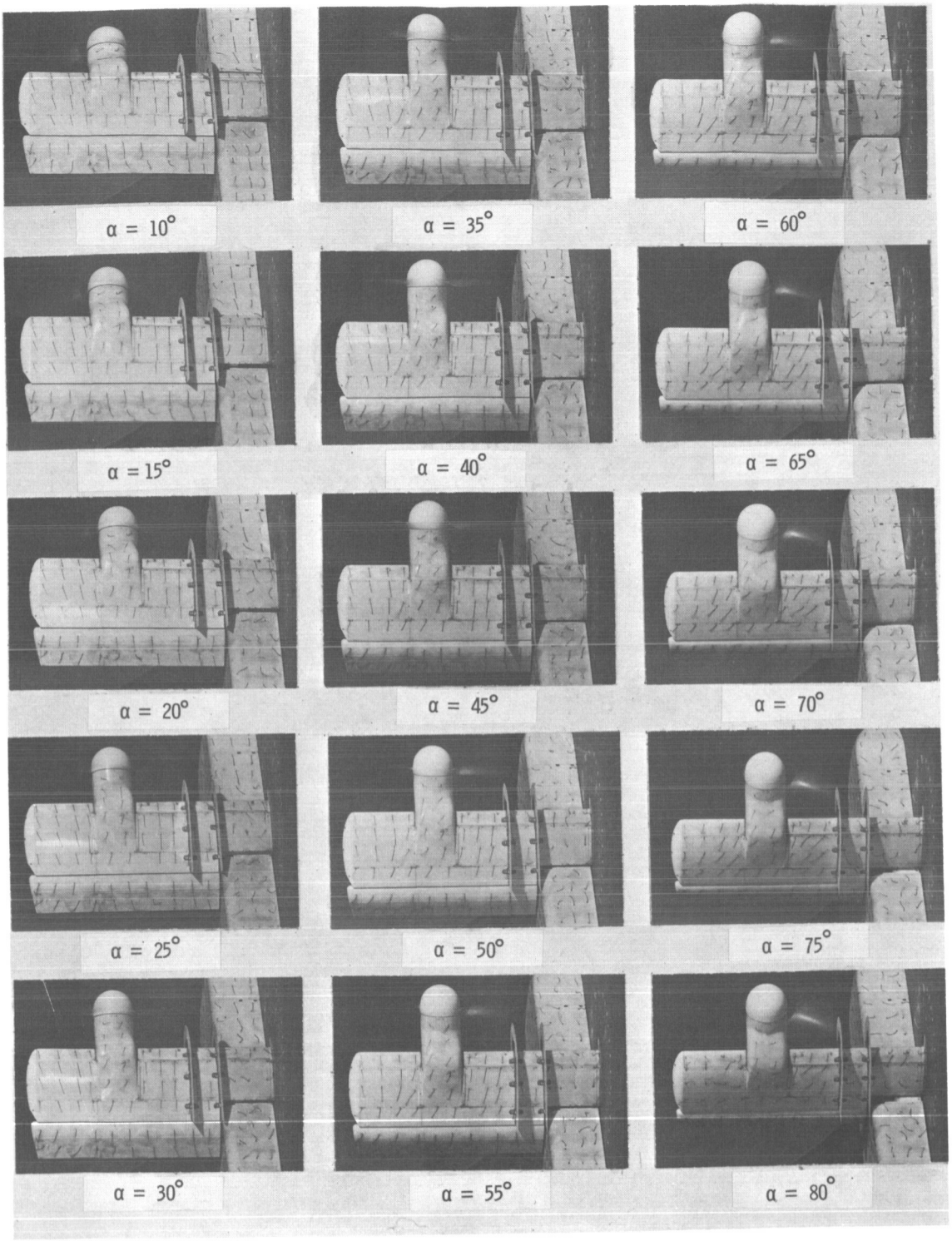
(a) Aerodynamic characteristics.

Figure 10.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, fences on, and $\delta_f = 20^0$.



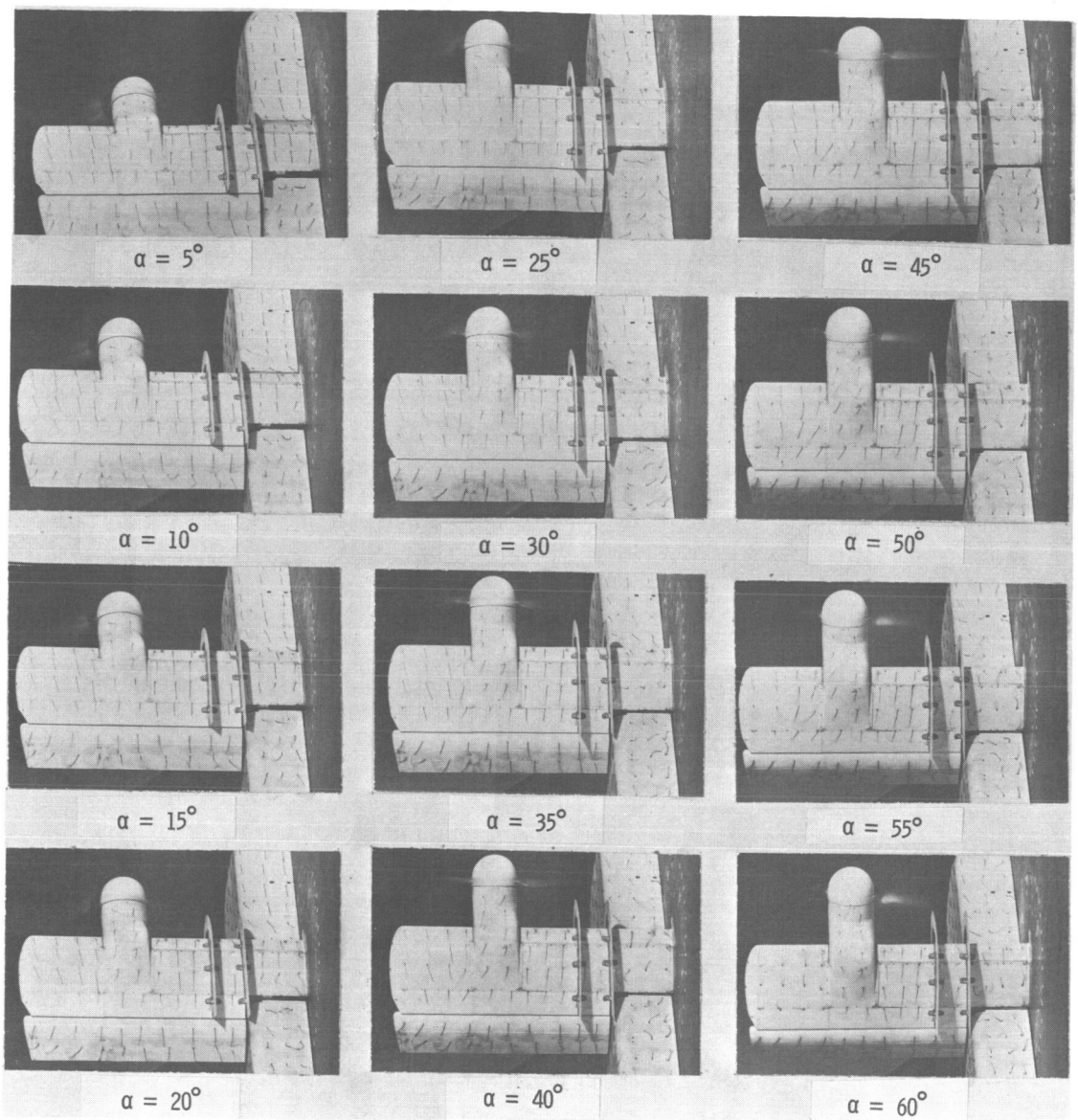
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 10.- Continued.



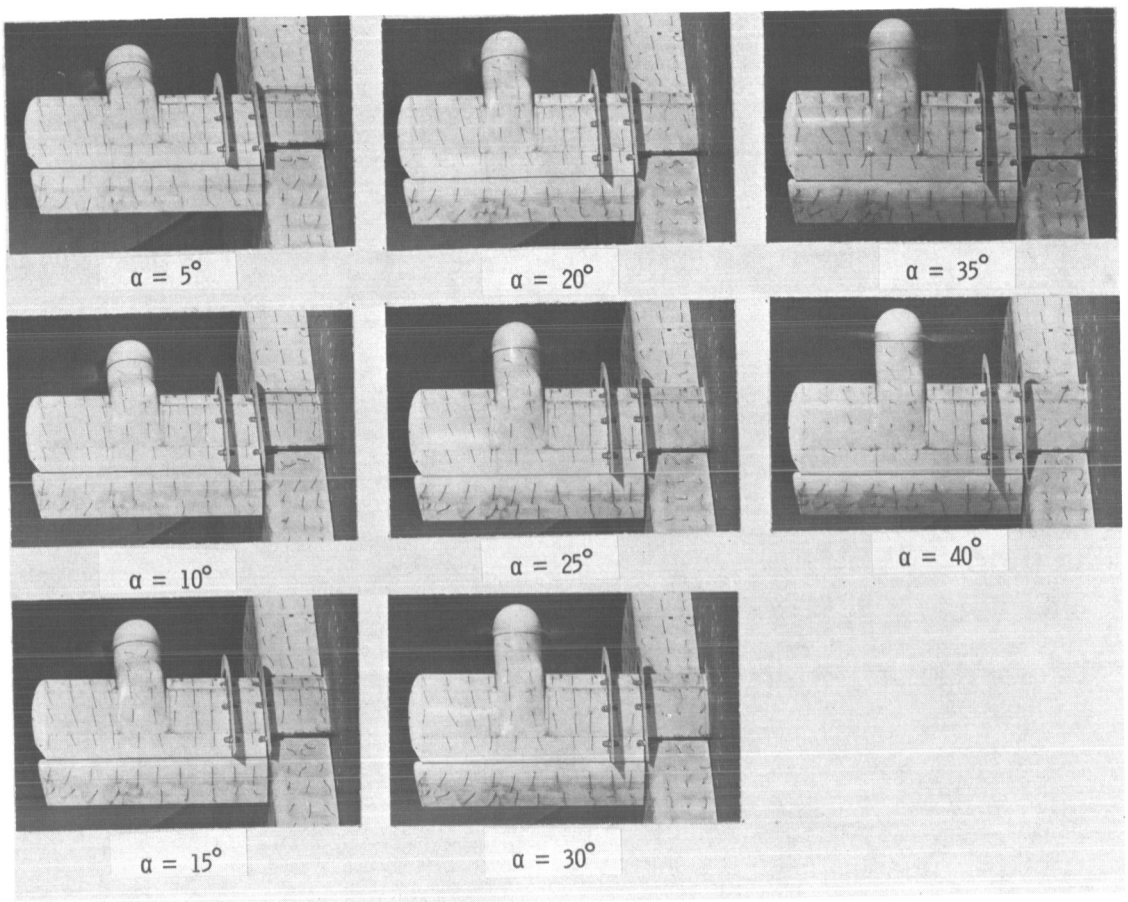
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 10.- Continued.



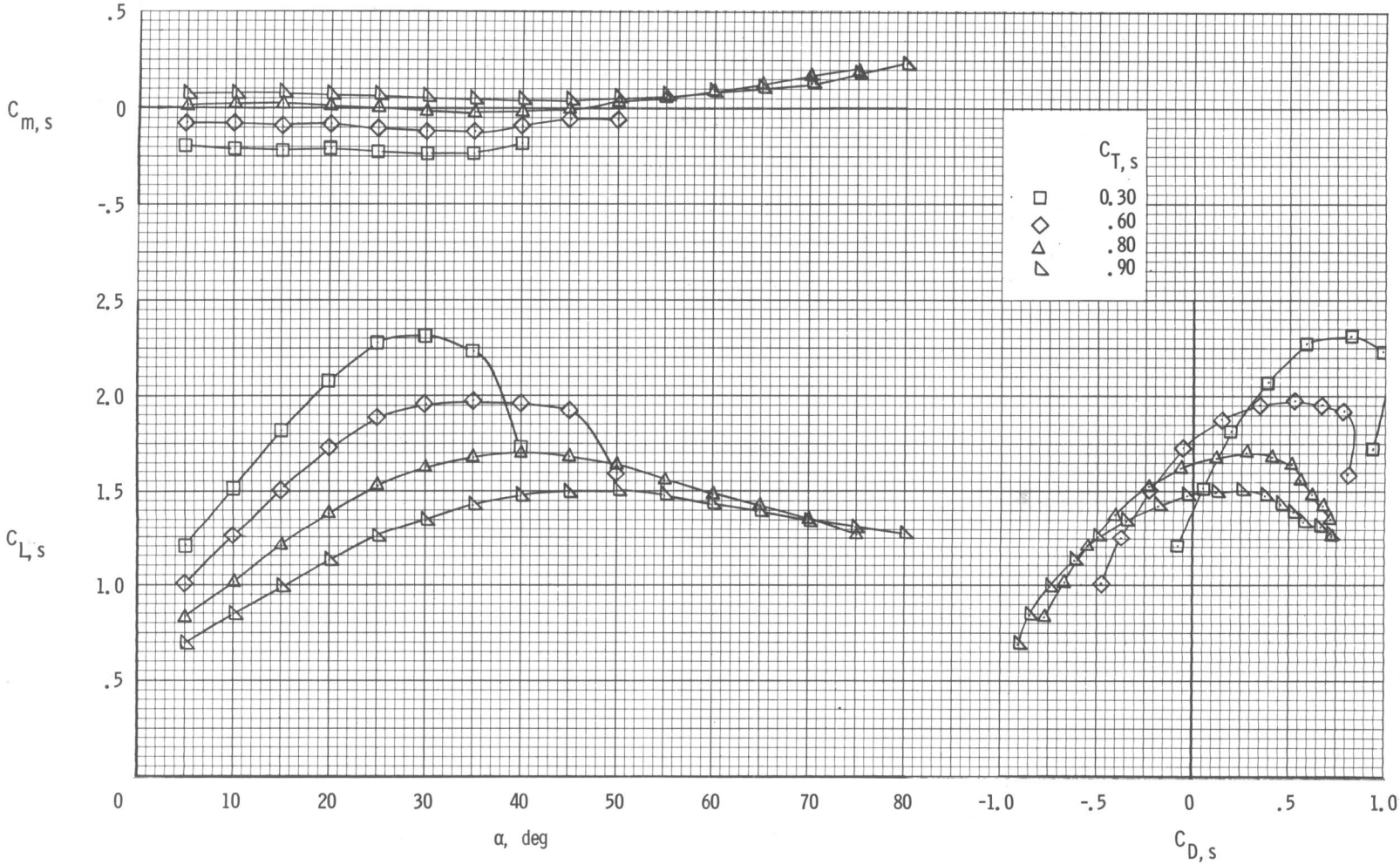
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 10.- Continued.



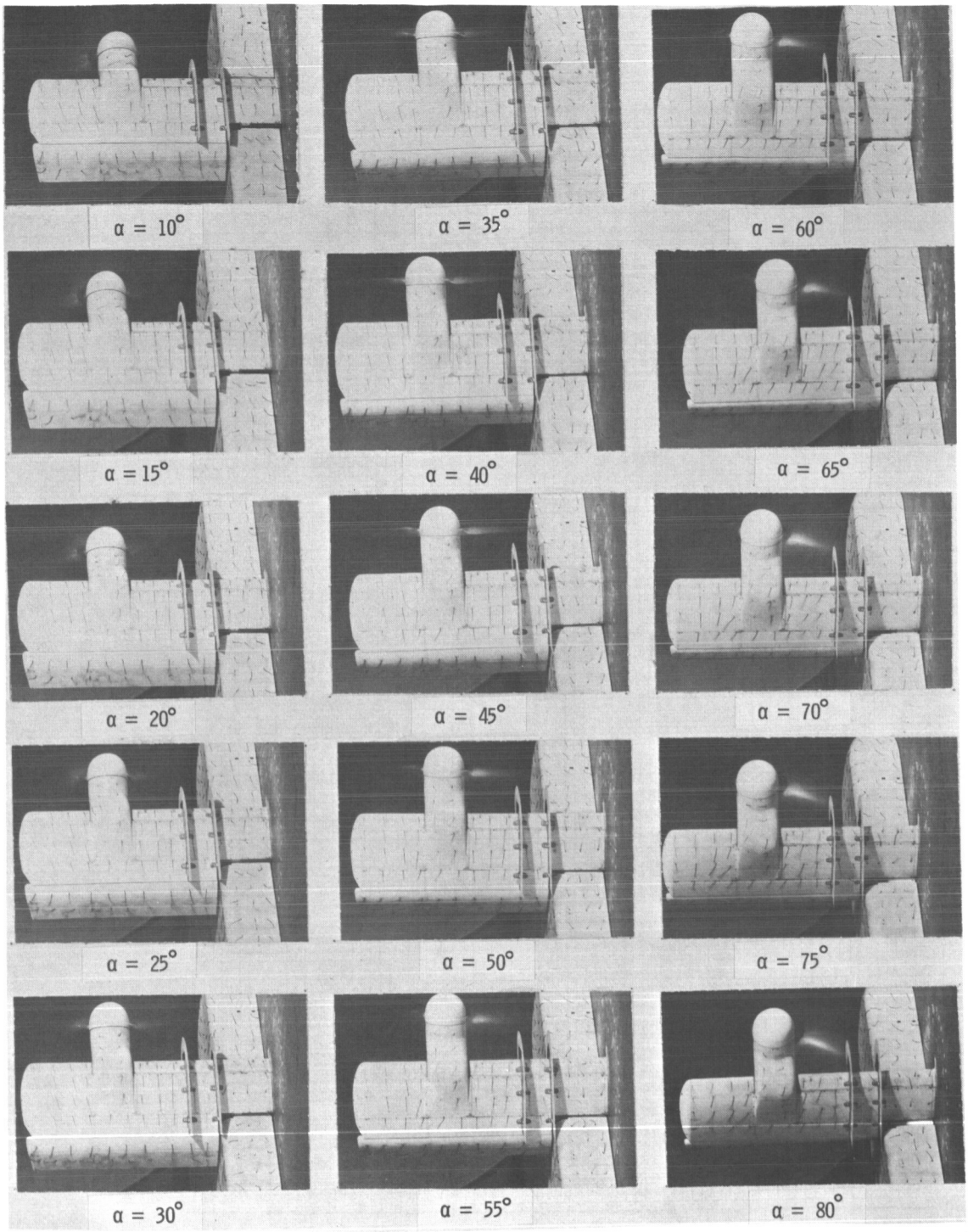
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 10.- Concluded.



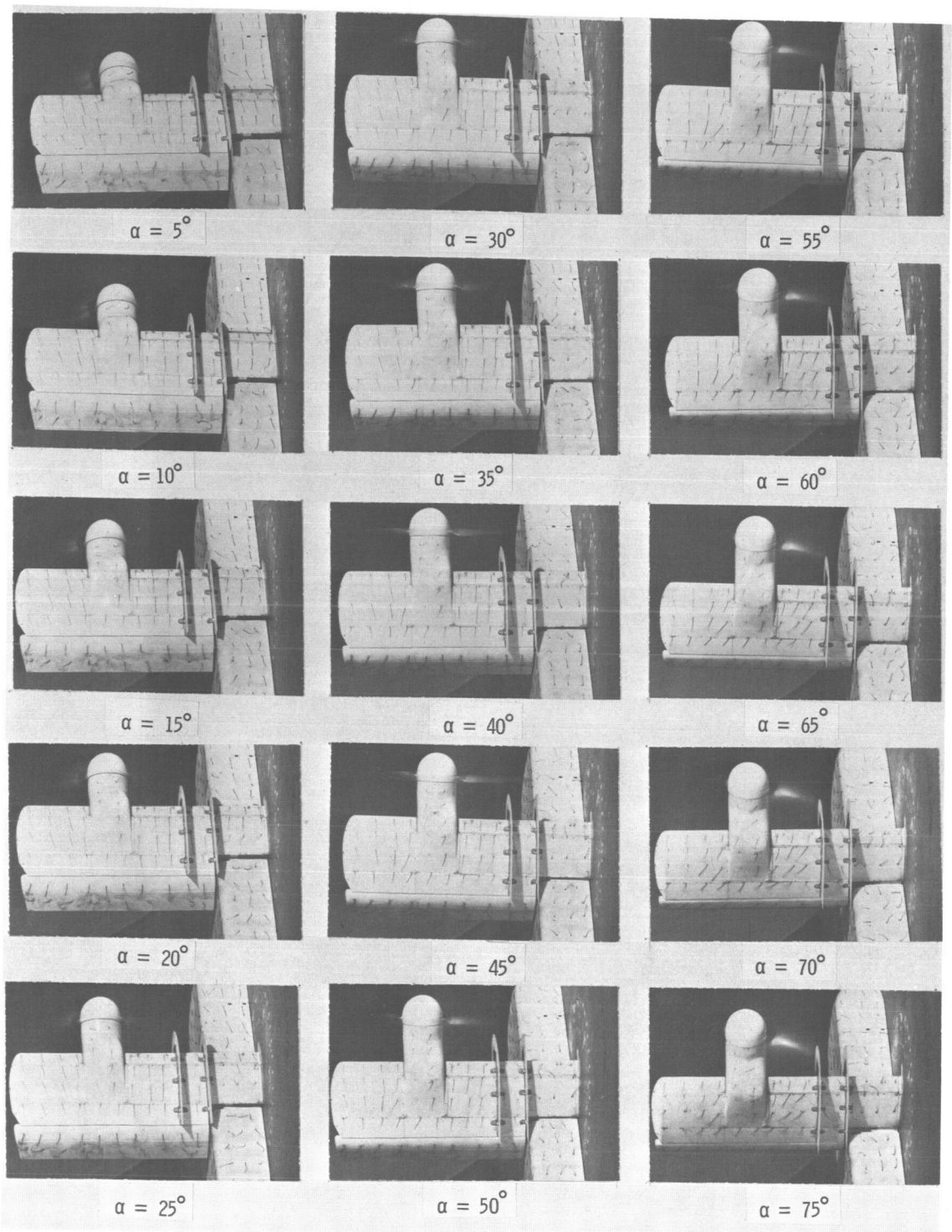
(a) Aerodynamic characteristics.

Figure 11.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, fences on, and $\delta_f = 40^o$.



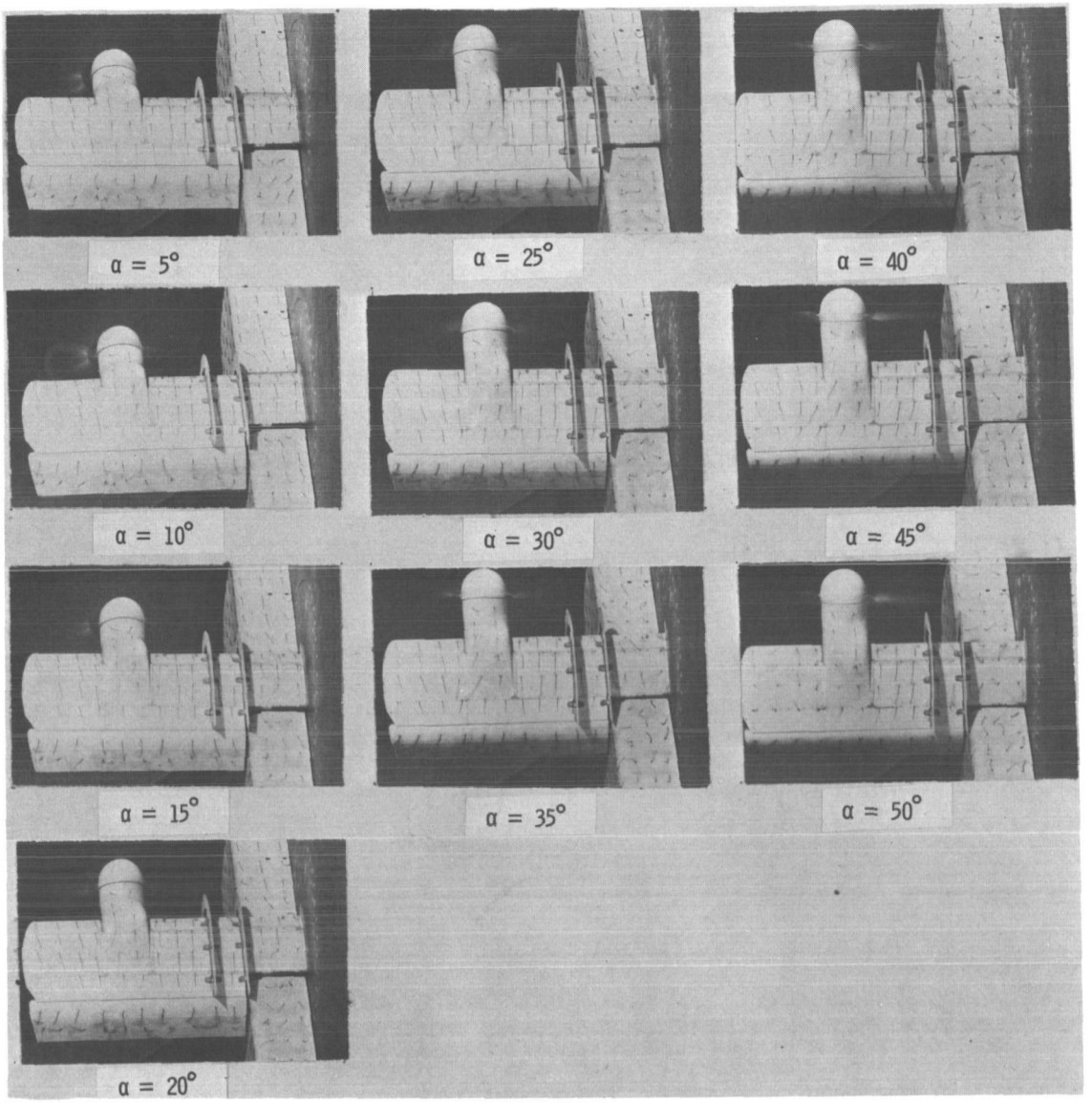
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 11.- Continued.



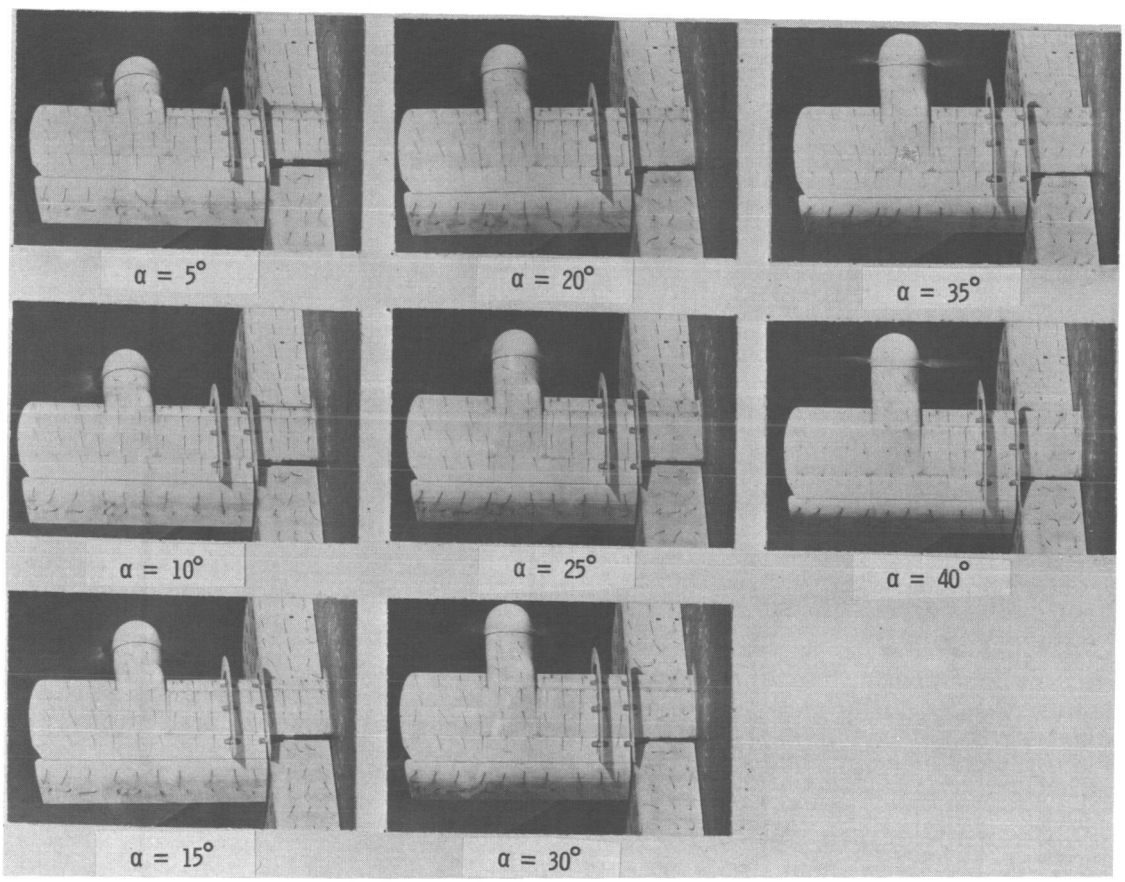
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 11.- Continued.



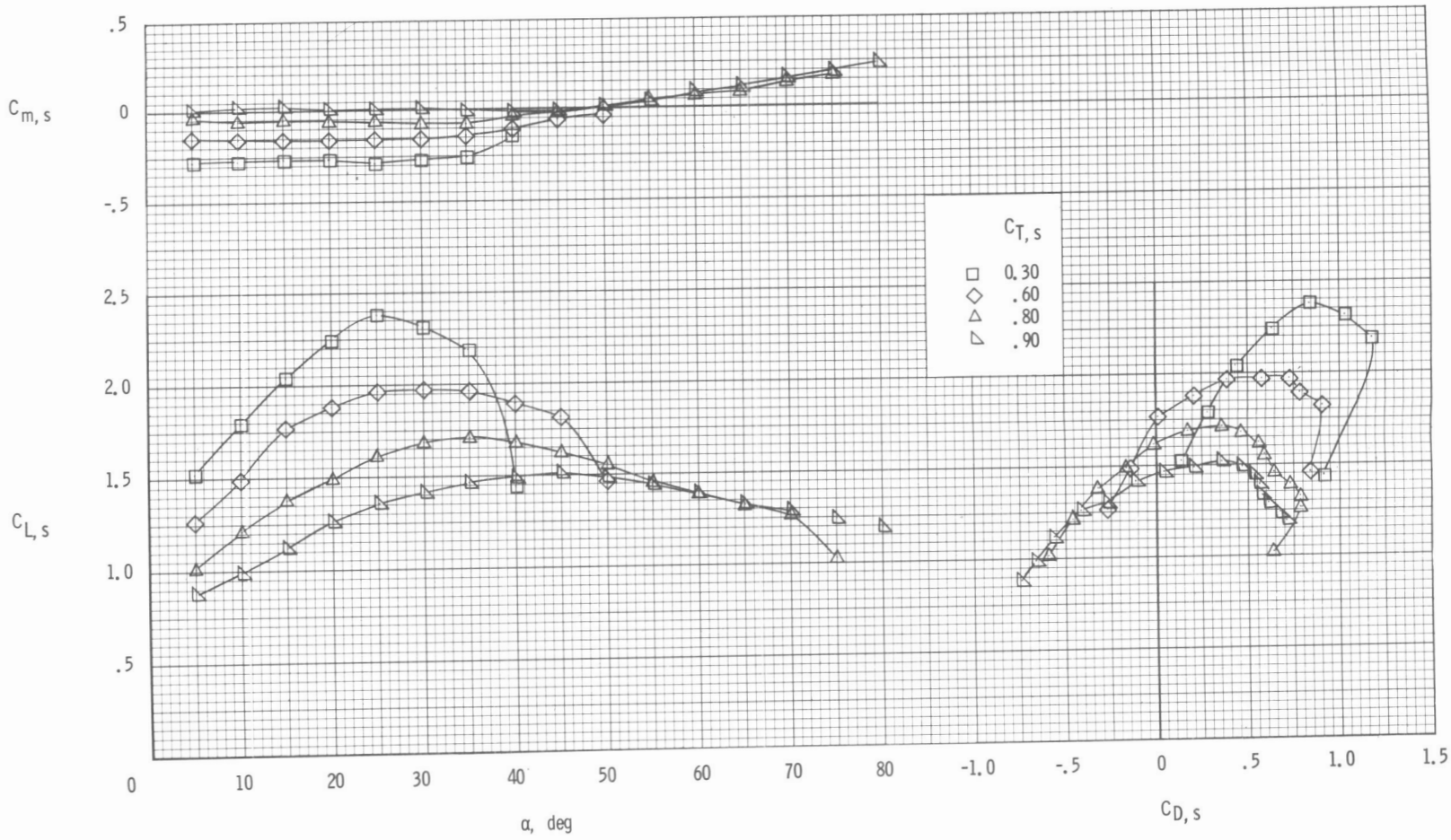
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 11.- Continued.



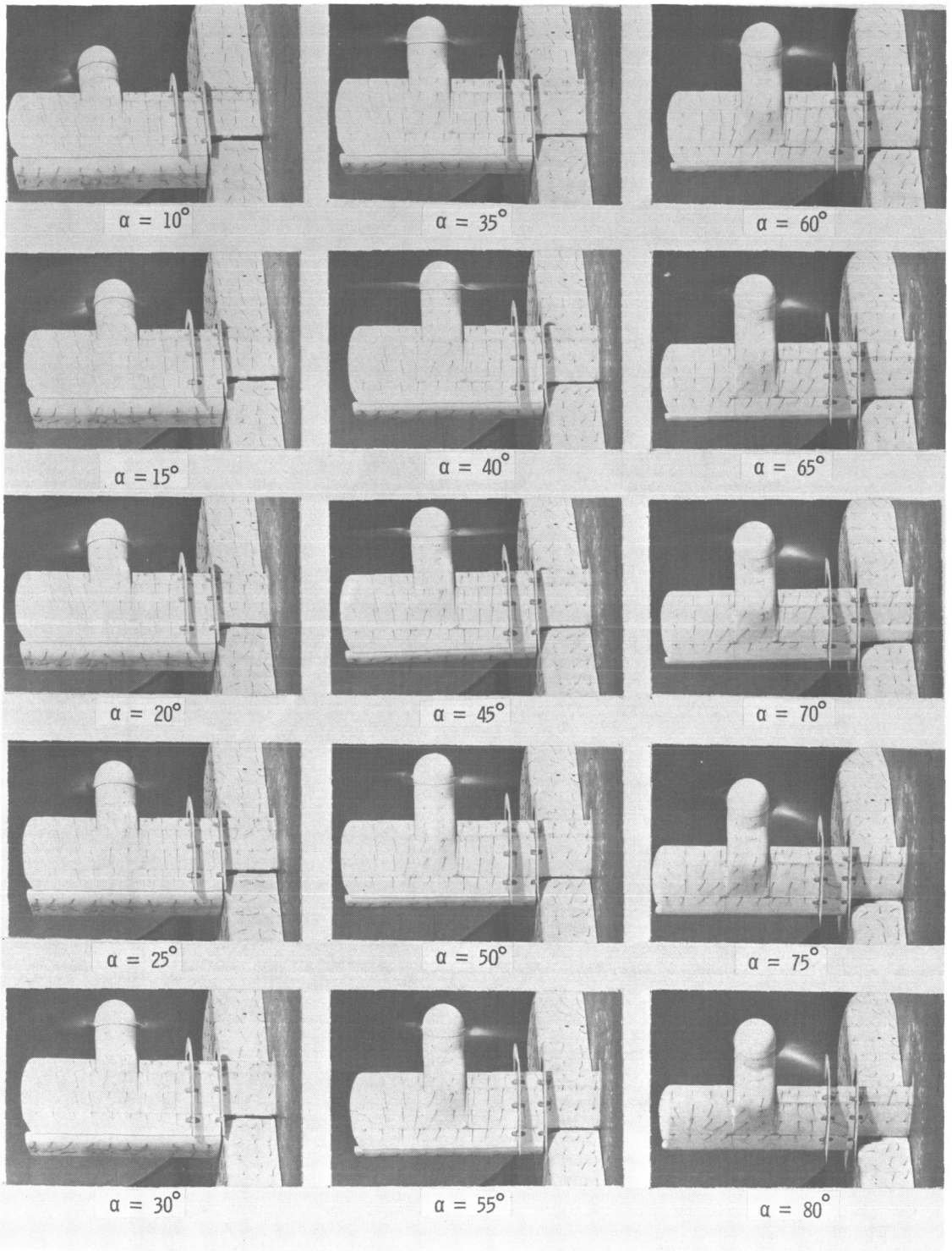
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 11.- Concluded.



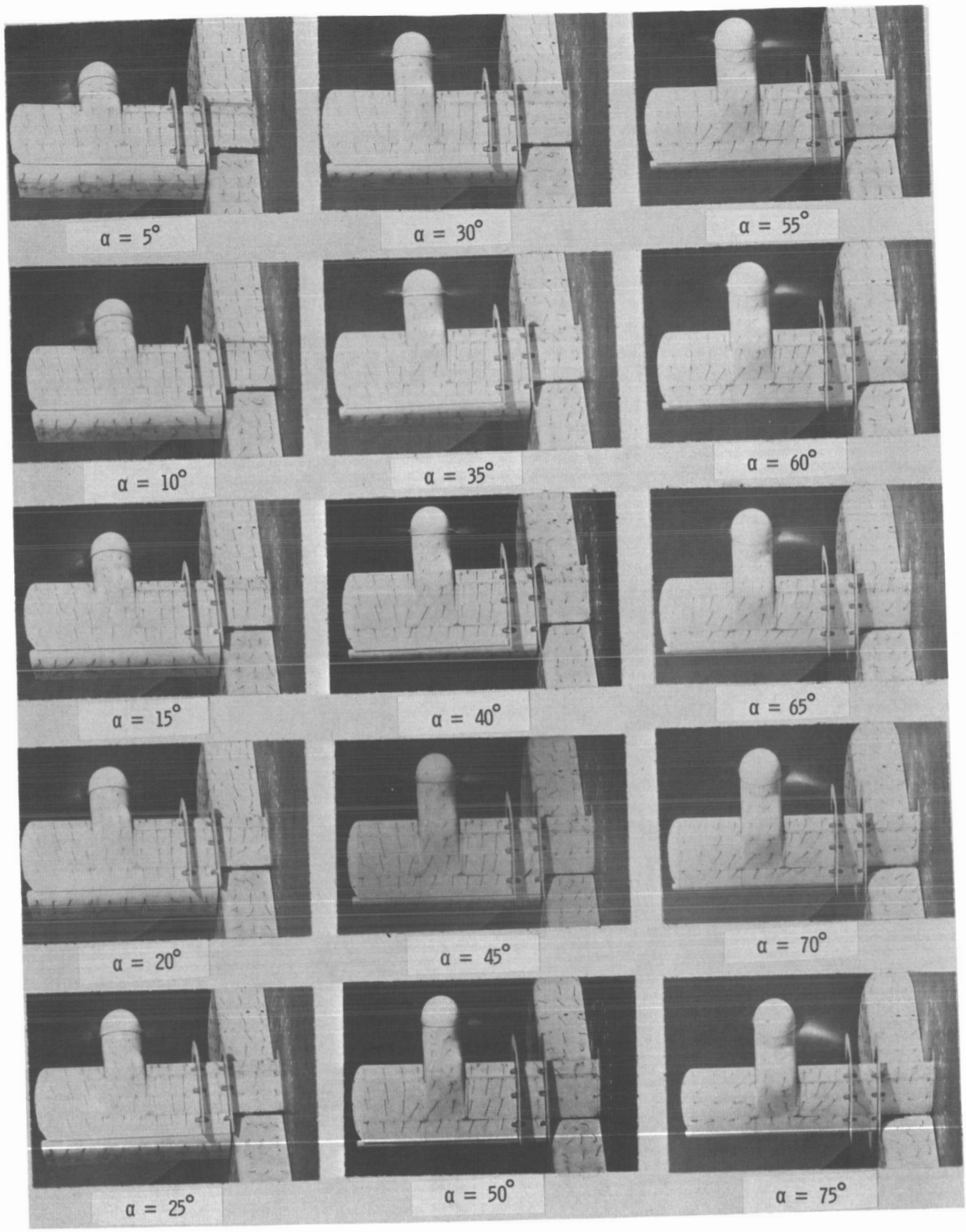
(a) Aerodynamic characteristics.

Figure 12.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, basic leading edge, fences on, and $\delta_f = 60^o$.



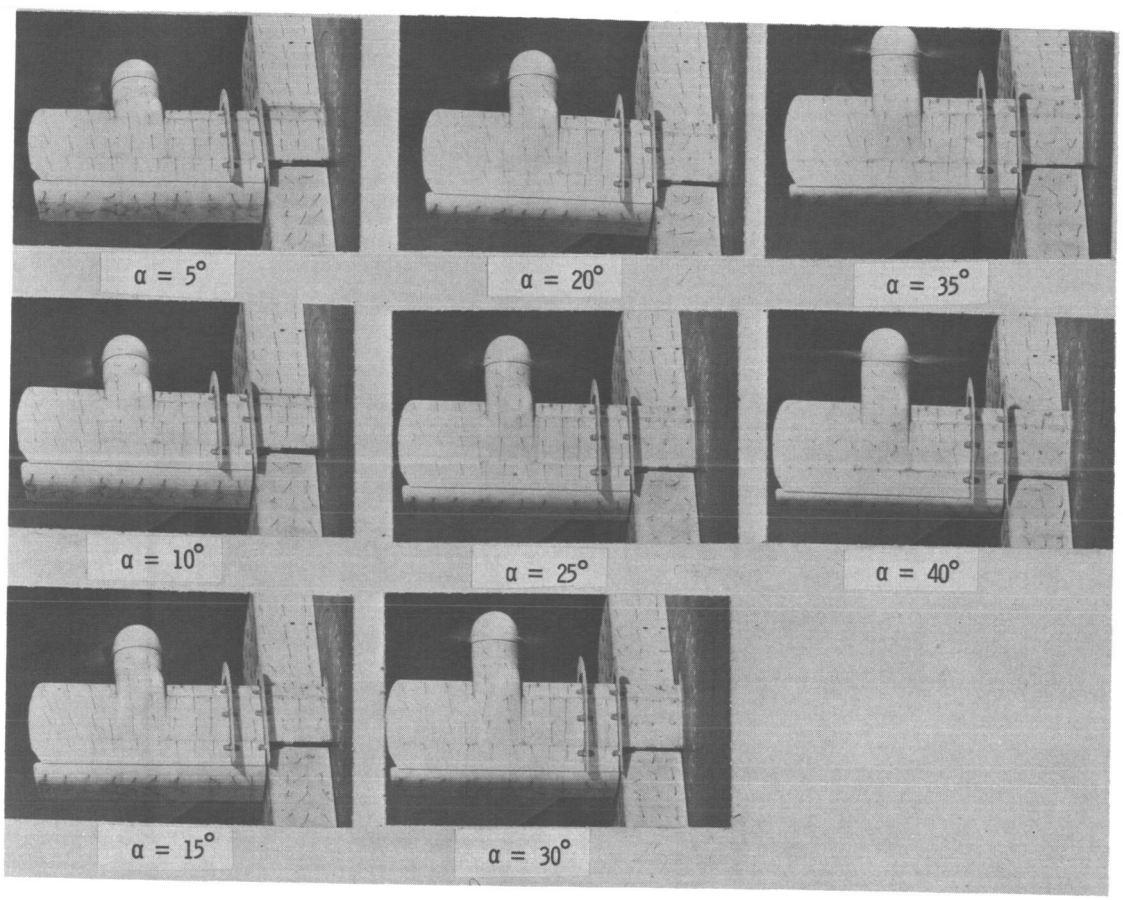
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 12.- Continued.



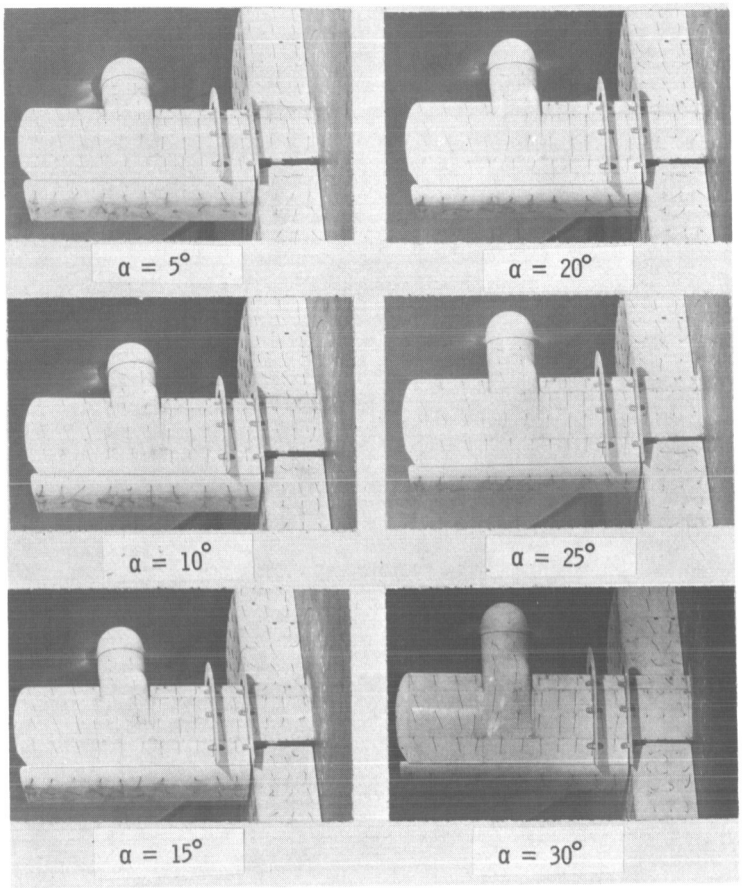
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 12.- Continued.



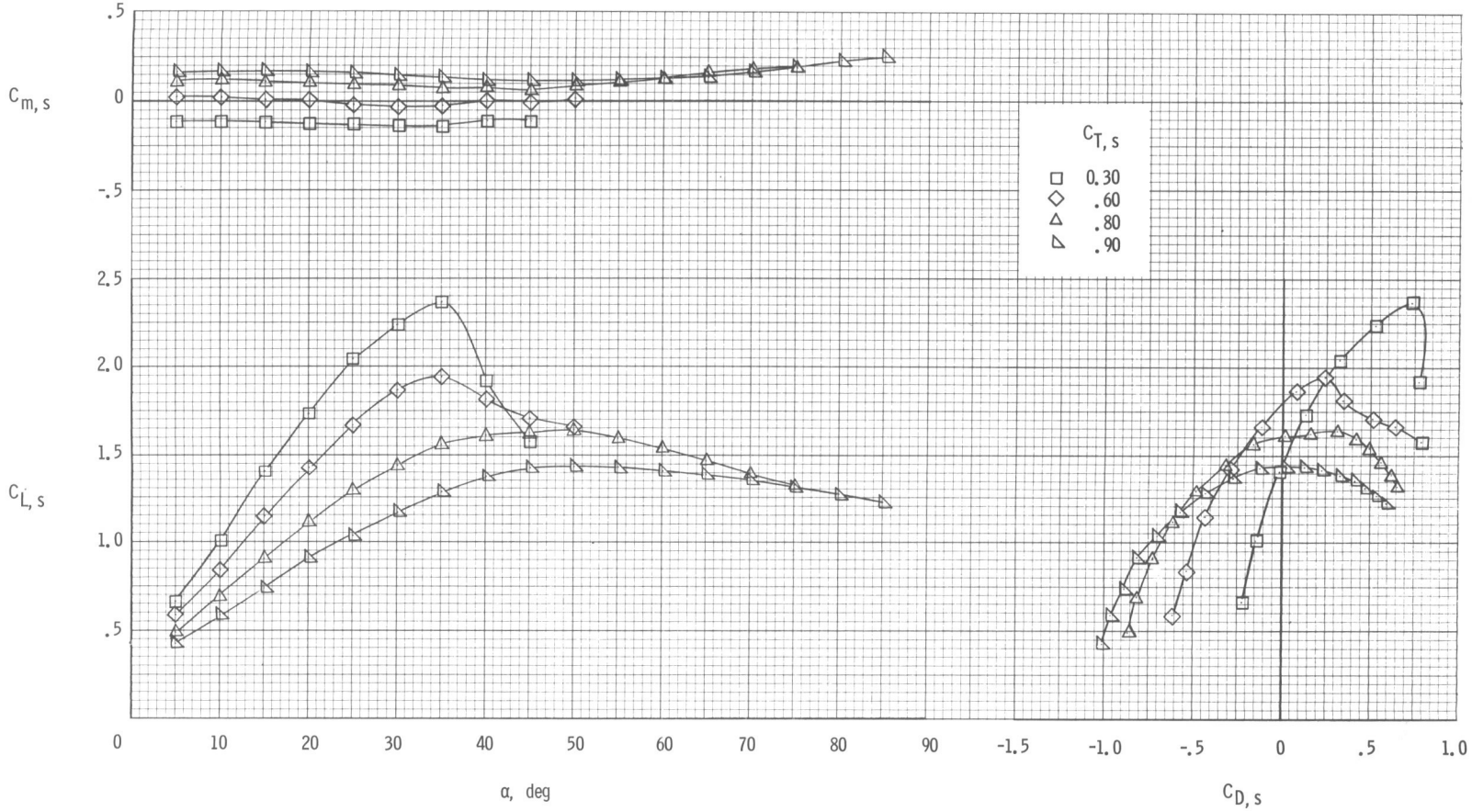
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 12.- Continued.



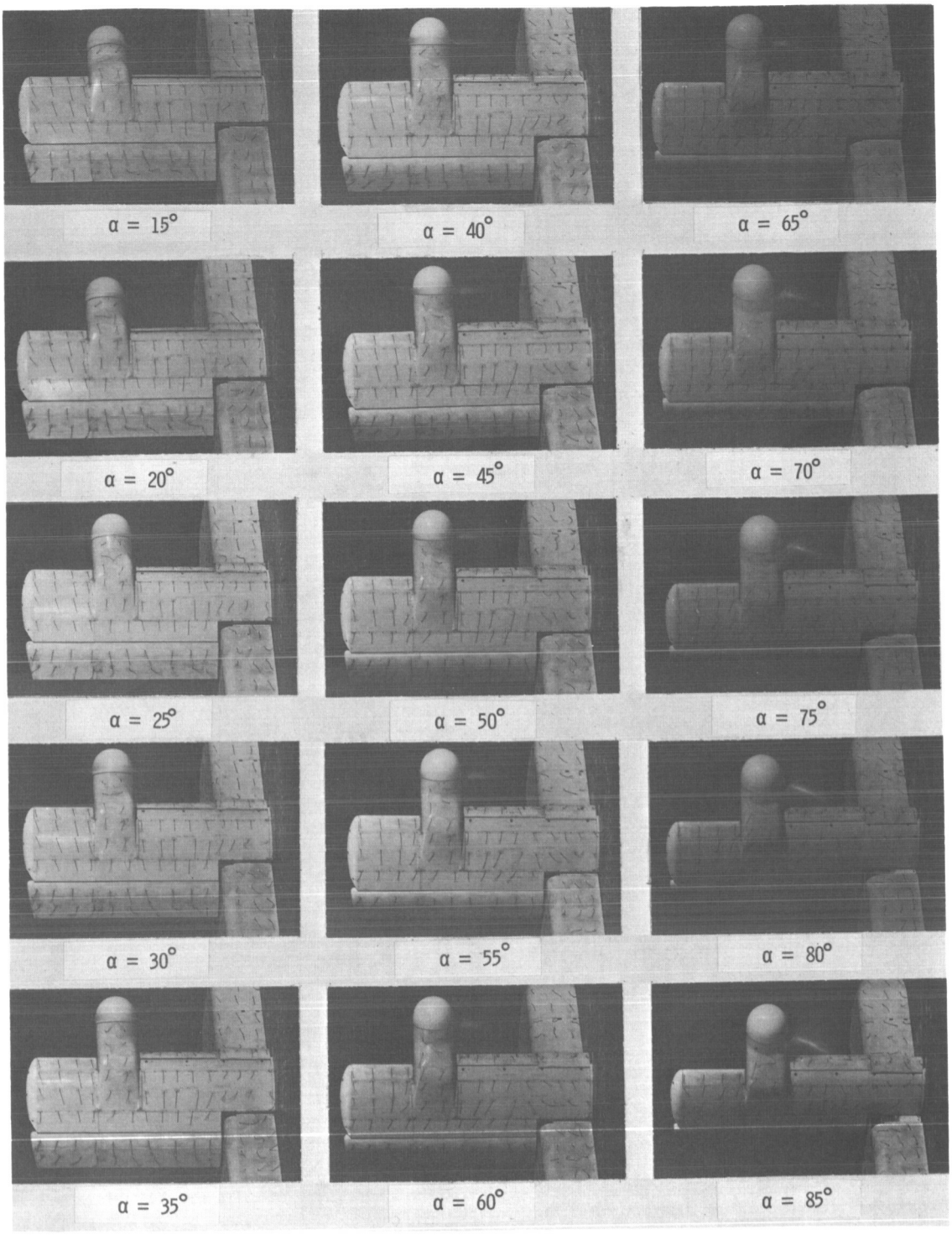
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 12.- Concluded.



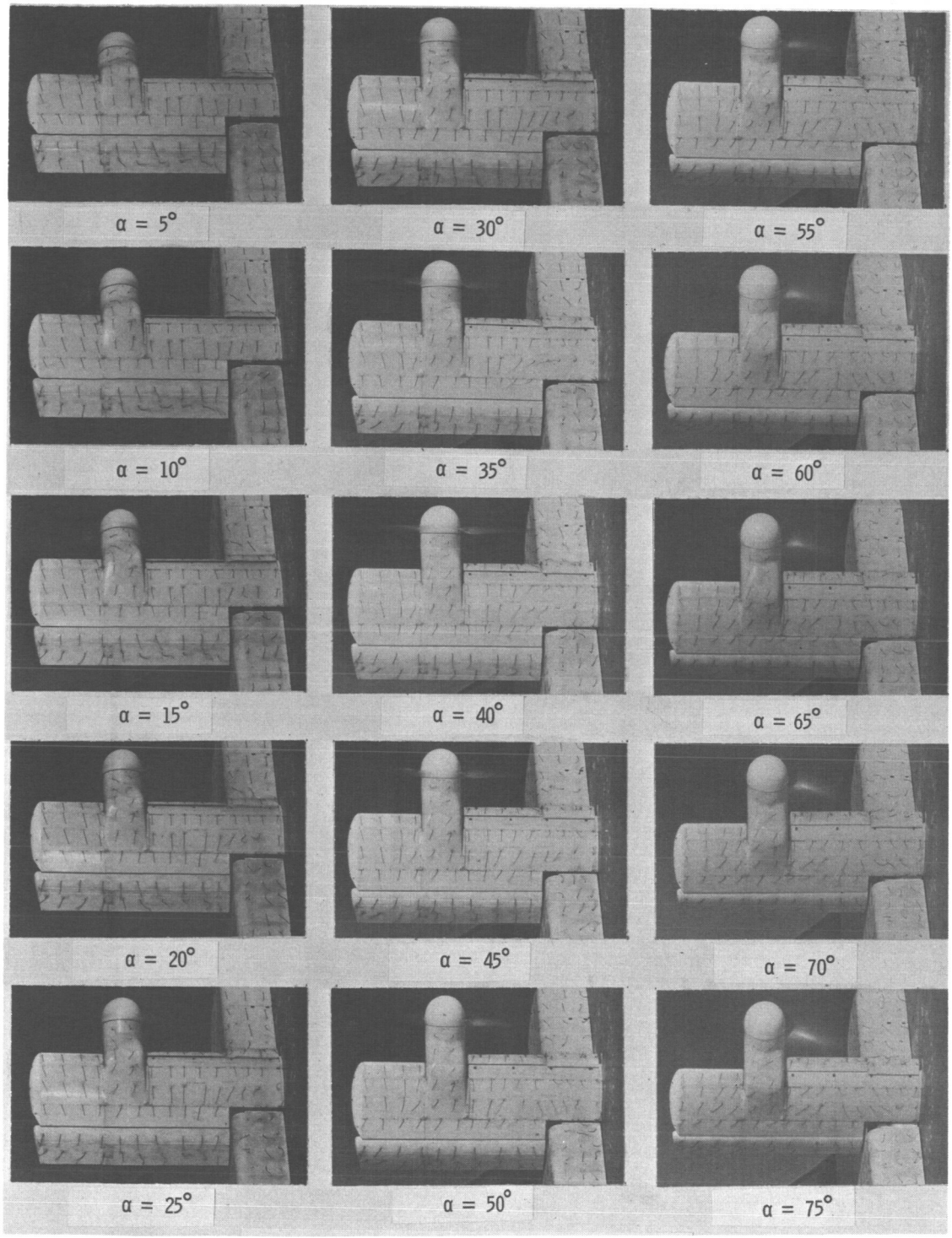
(a) Aerodynamic characteristics.

Figure 13.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, inboard slat on, and $\delta_f = 20^0$.



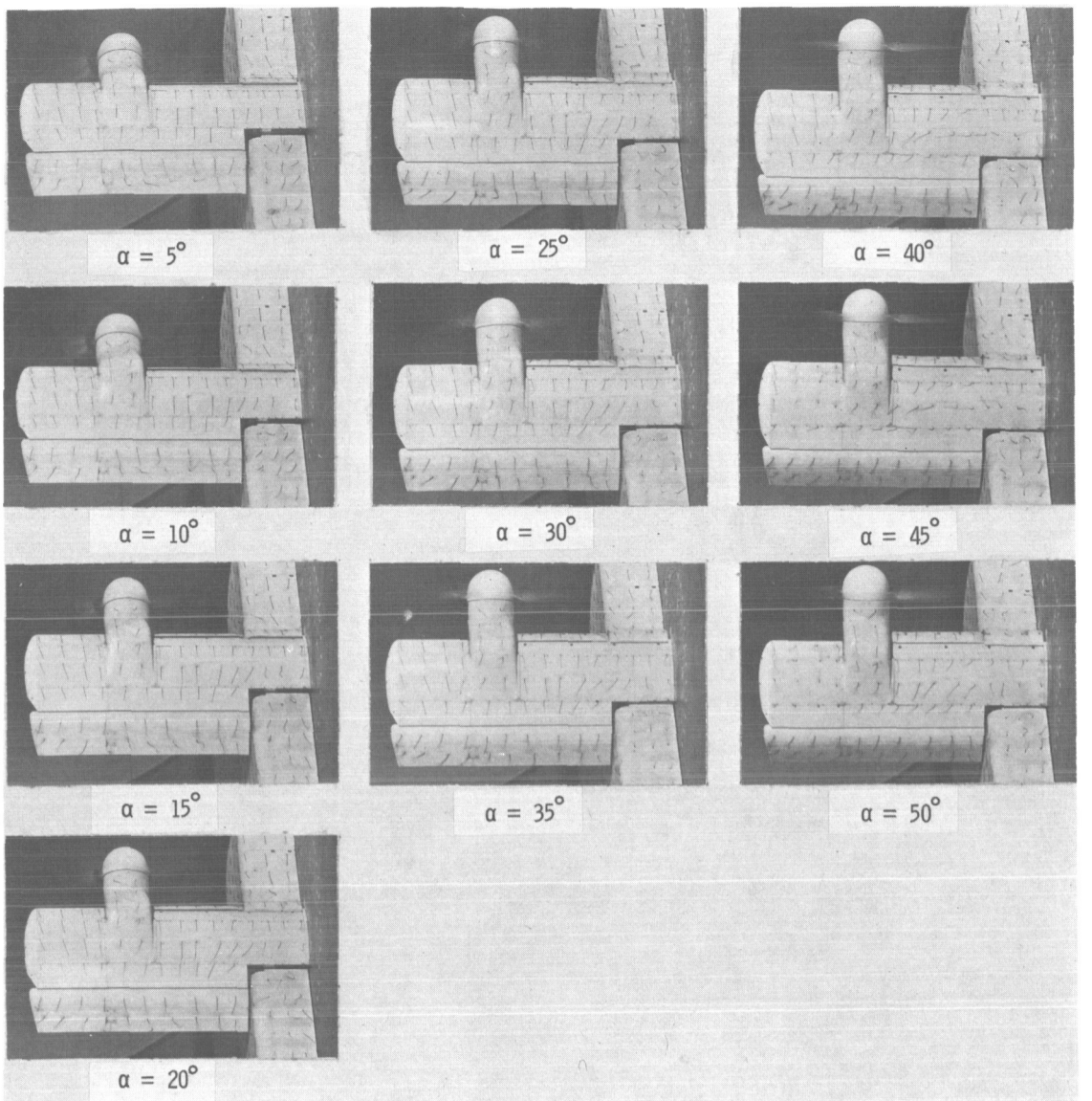
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 13.- Continued.



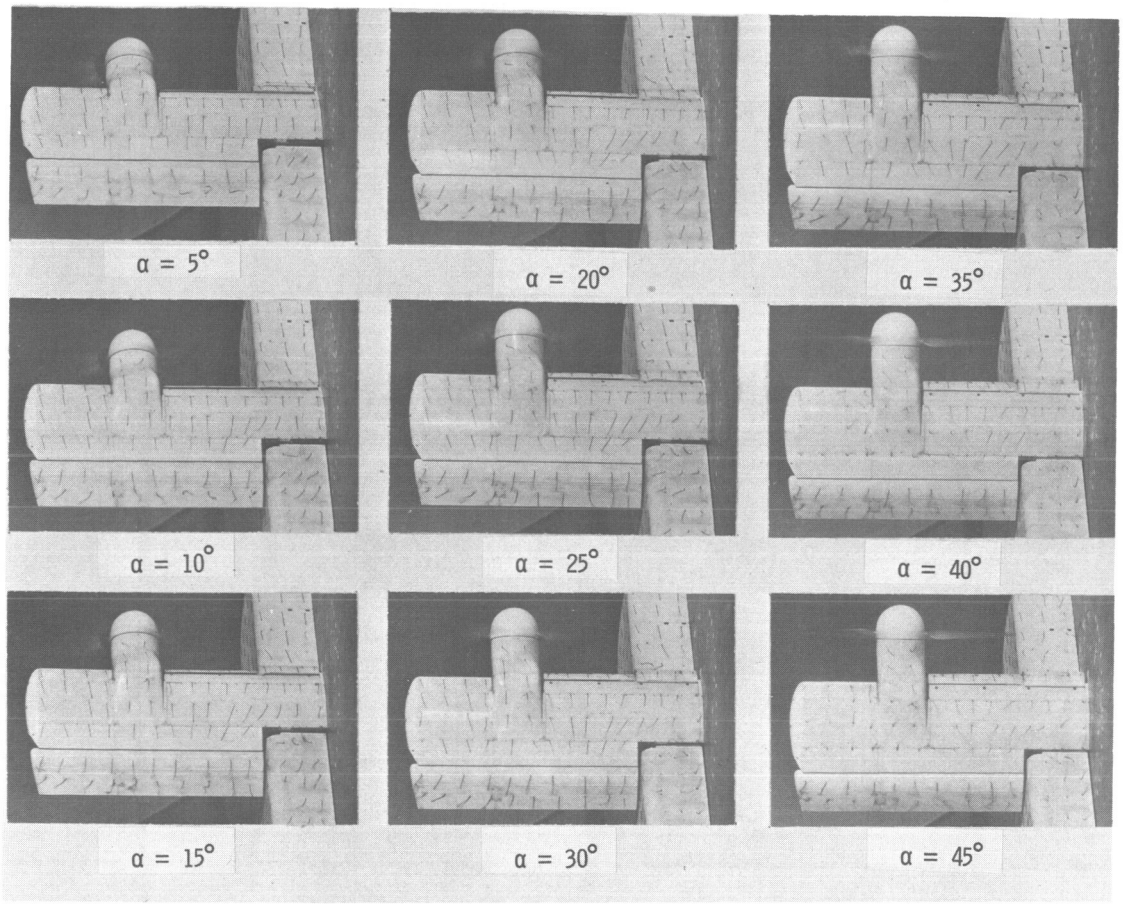
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 13.- Continued.



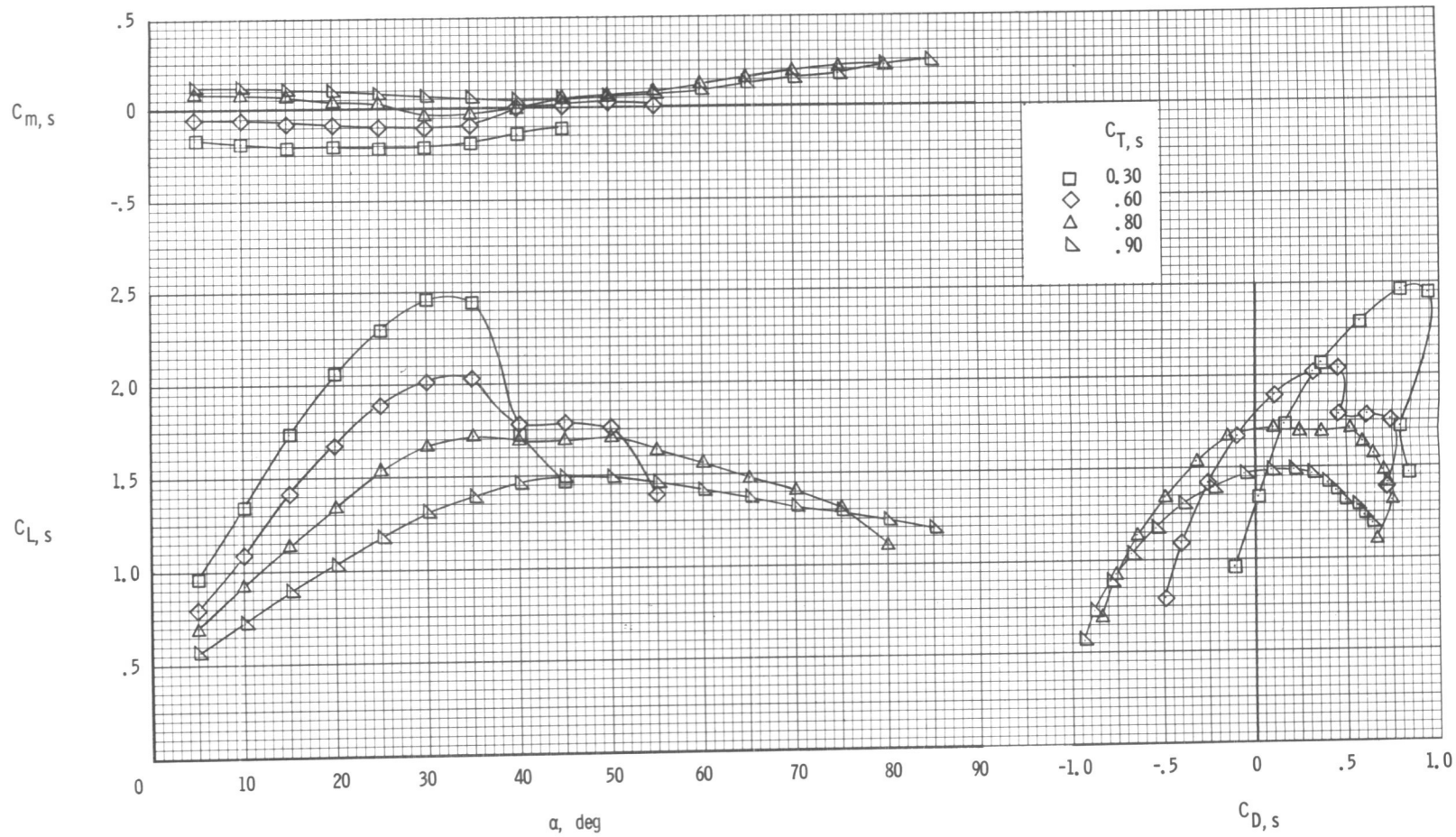
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 13.- Continued.



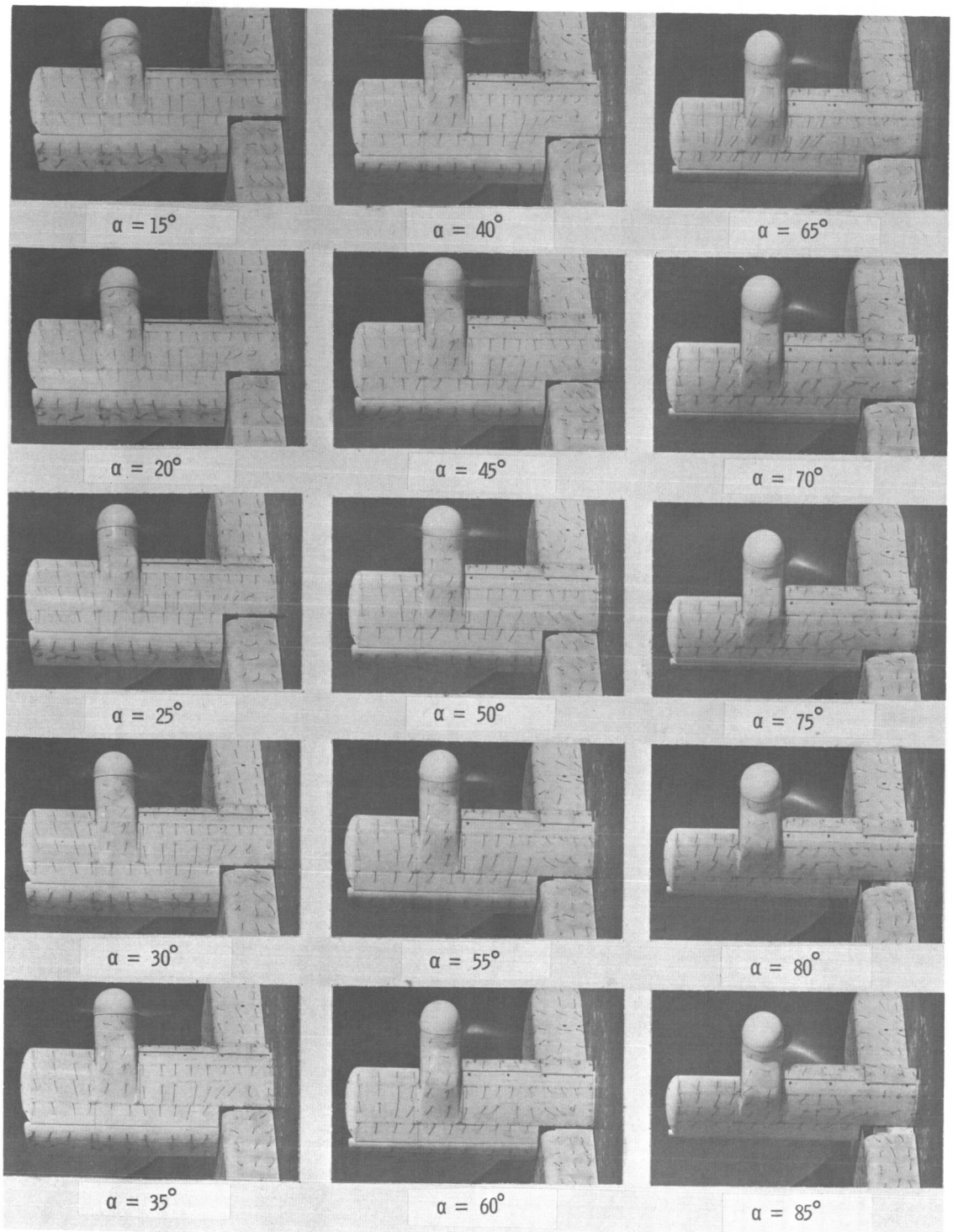
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 13.- Concluded.



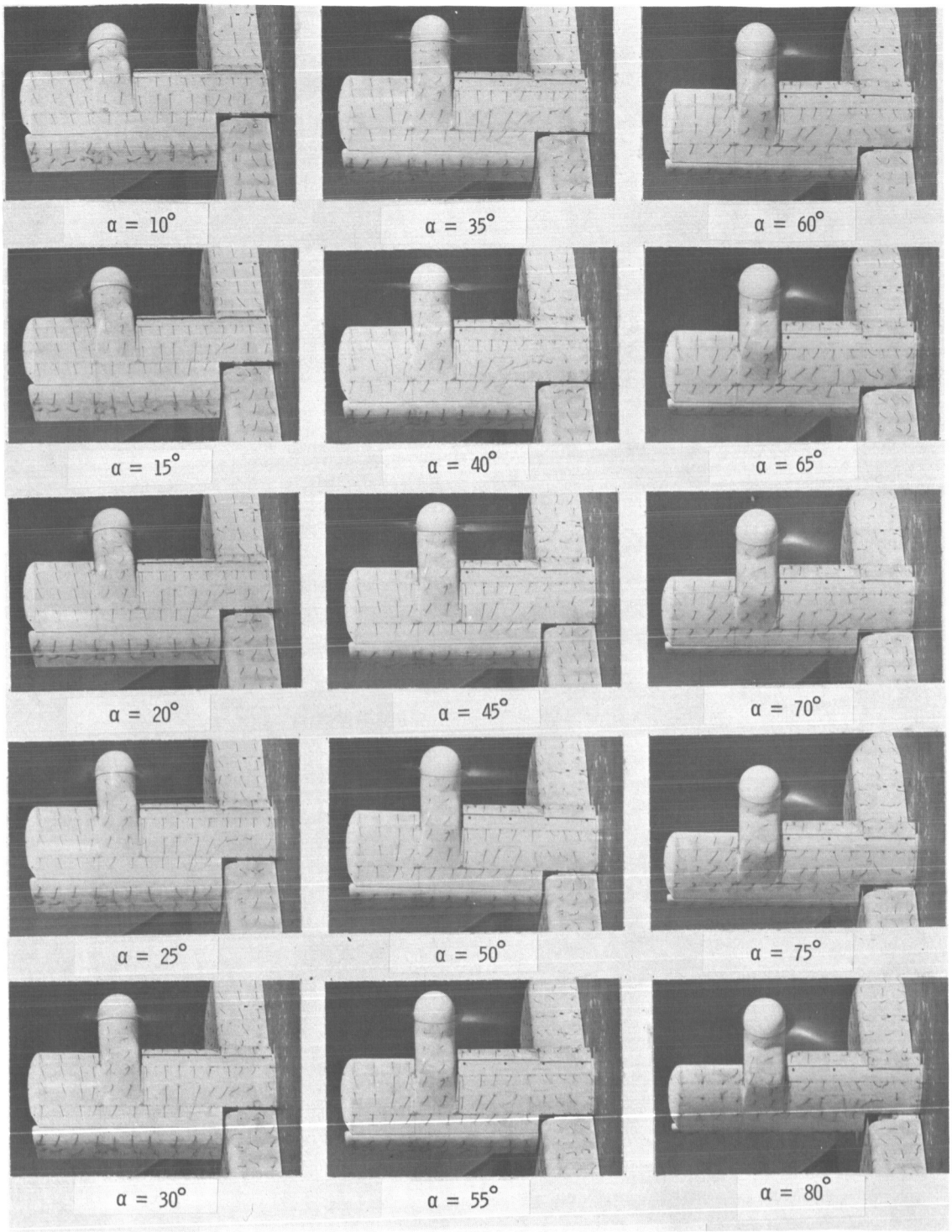
(a) Aerodynamic characteristics.

Figure 14.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, inboard slat on, and $\delta_f = 40^o$.



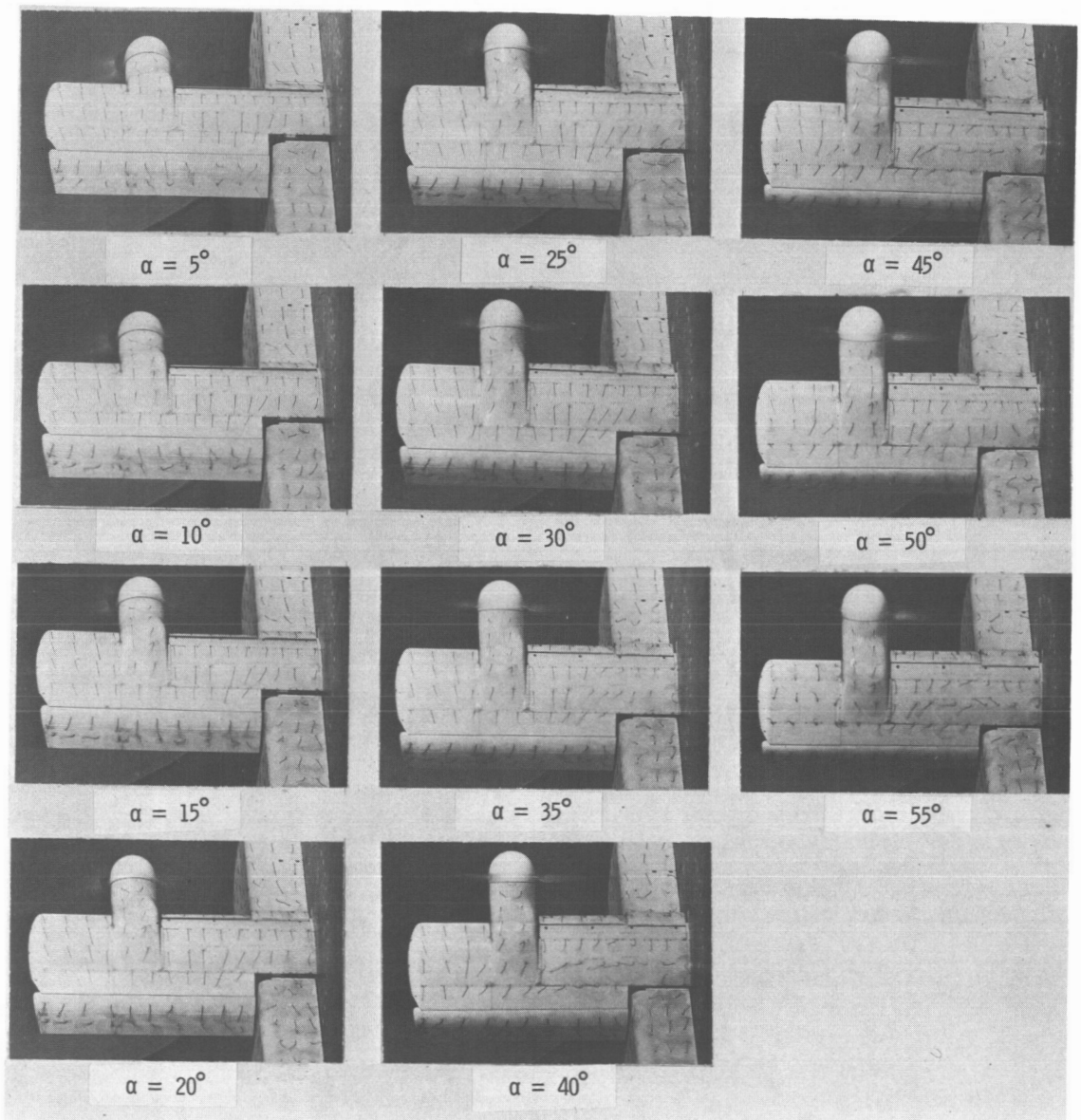
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 14.- Continued.



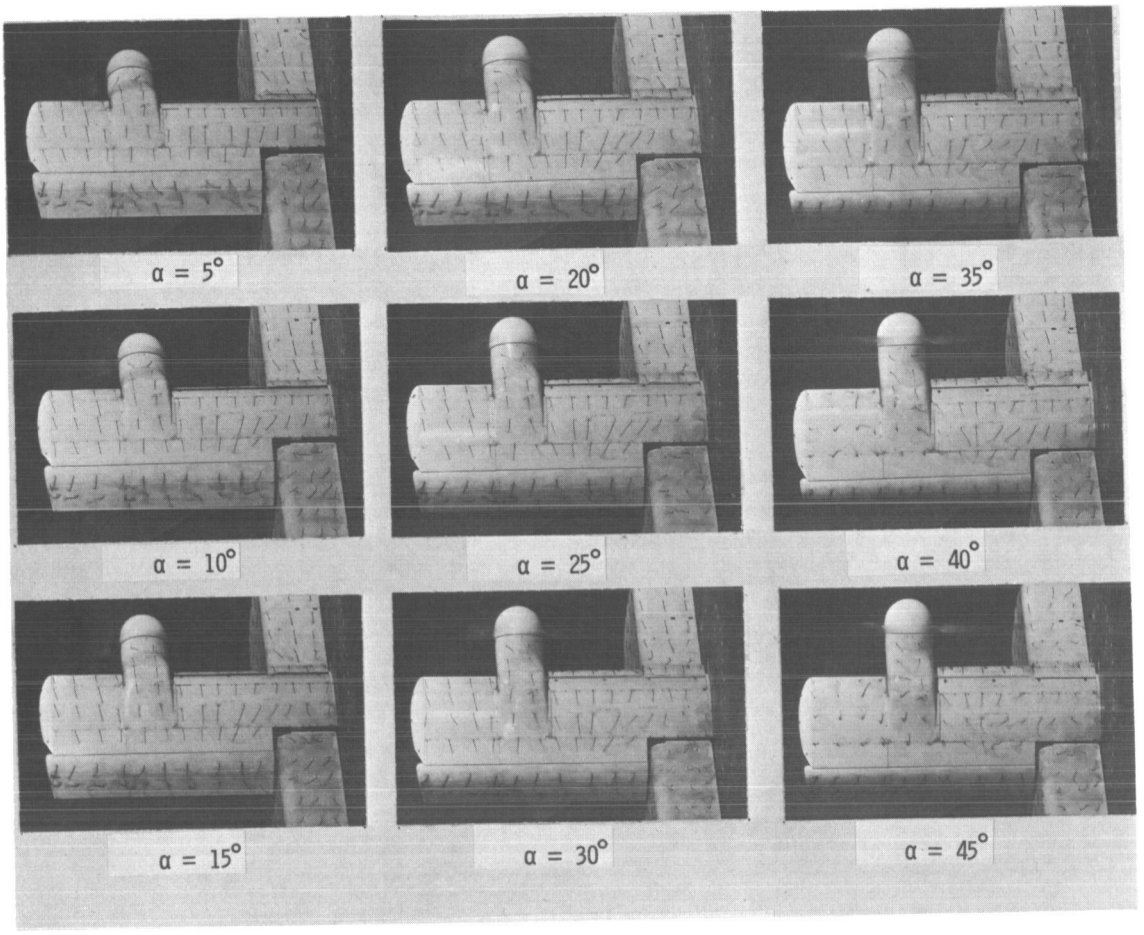
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 14.- Continued.



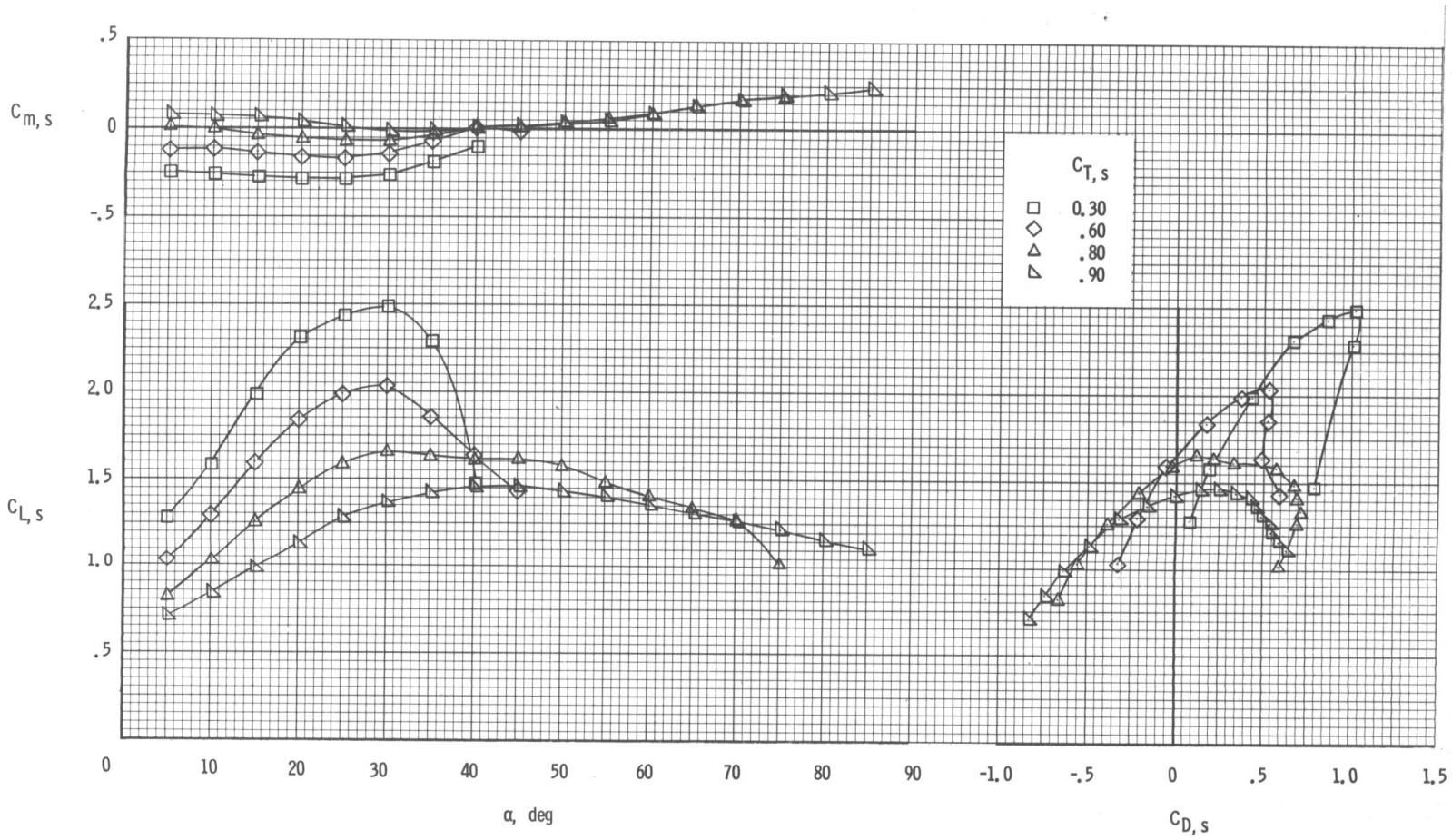
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 14.- Continued.



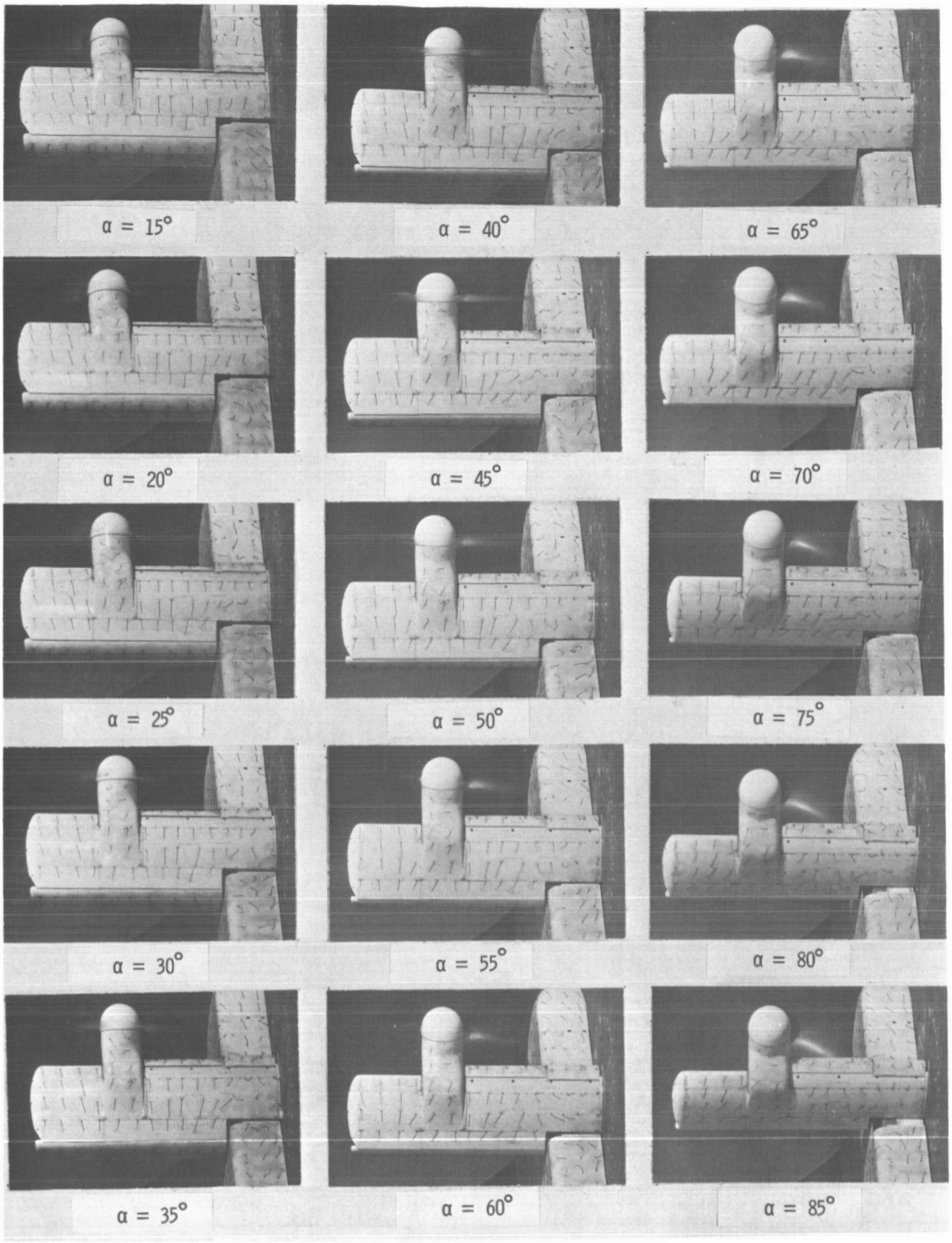
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 14.- Concluded.



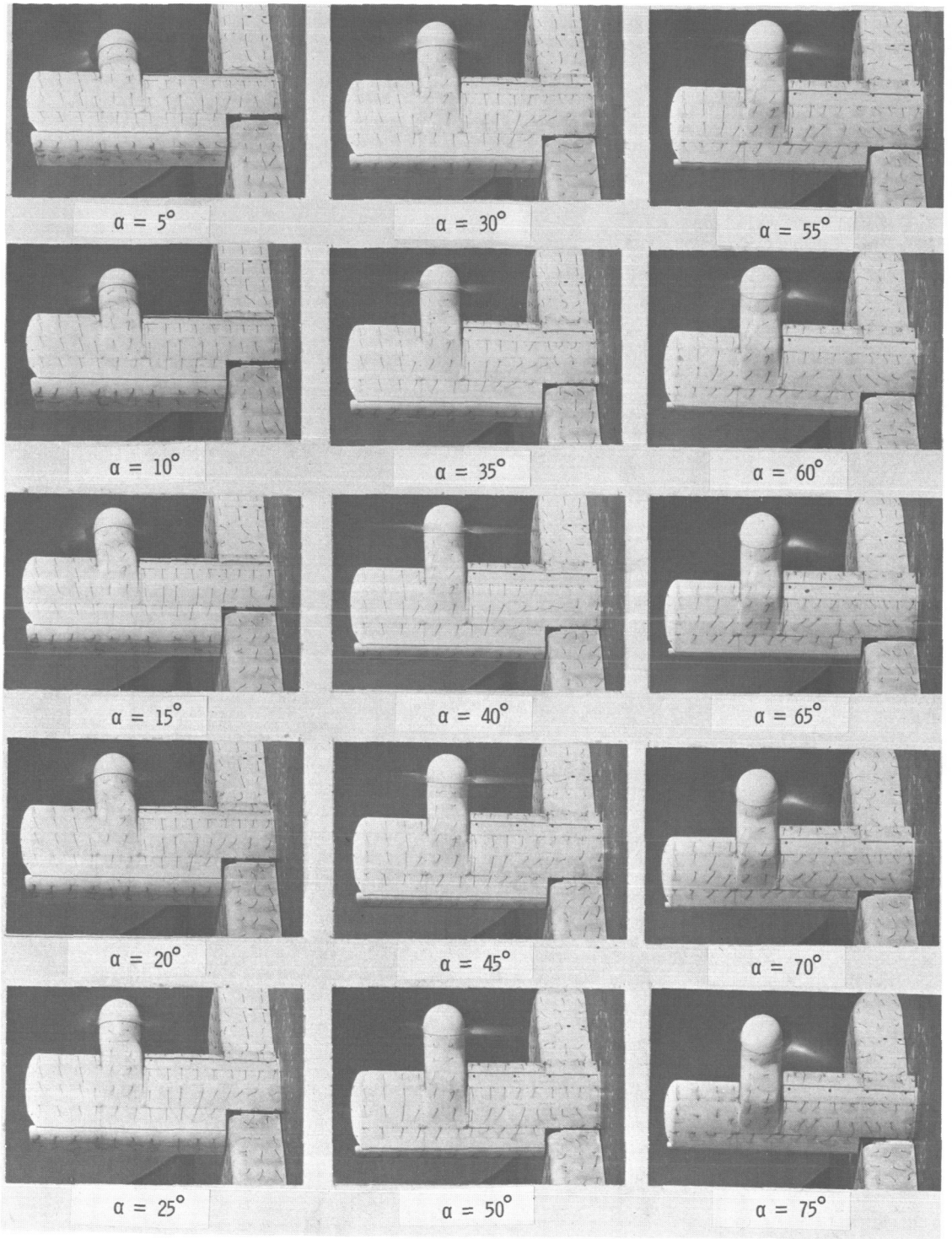
(a) Aerodynamic characteristics.

Figure 15.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, inboard slat on, and $\delta_f = 60^0$.



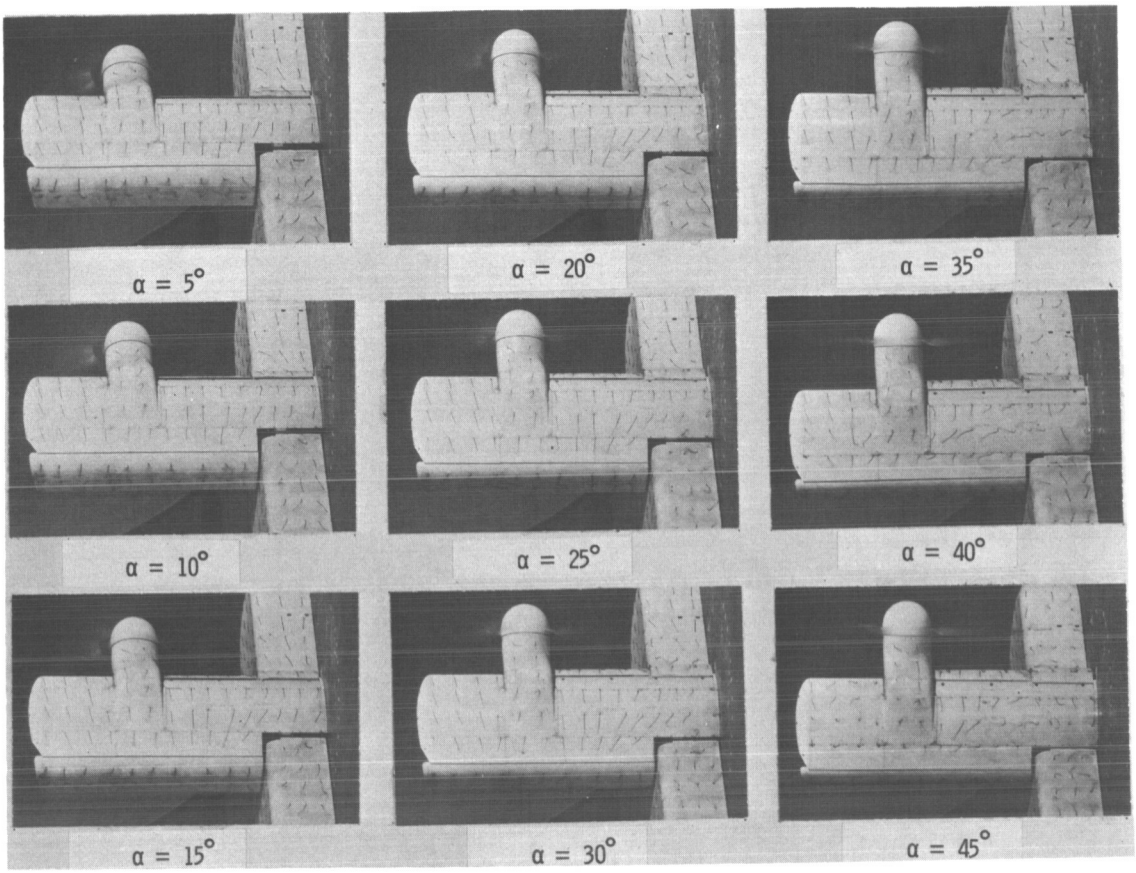
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 15.- Continued.



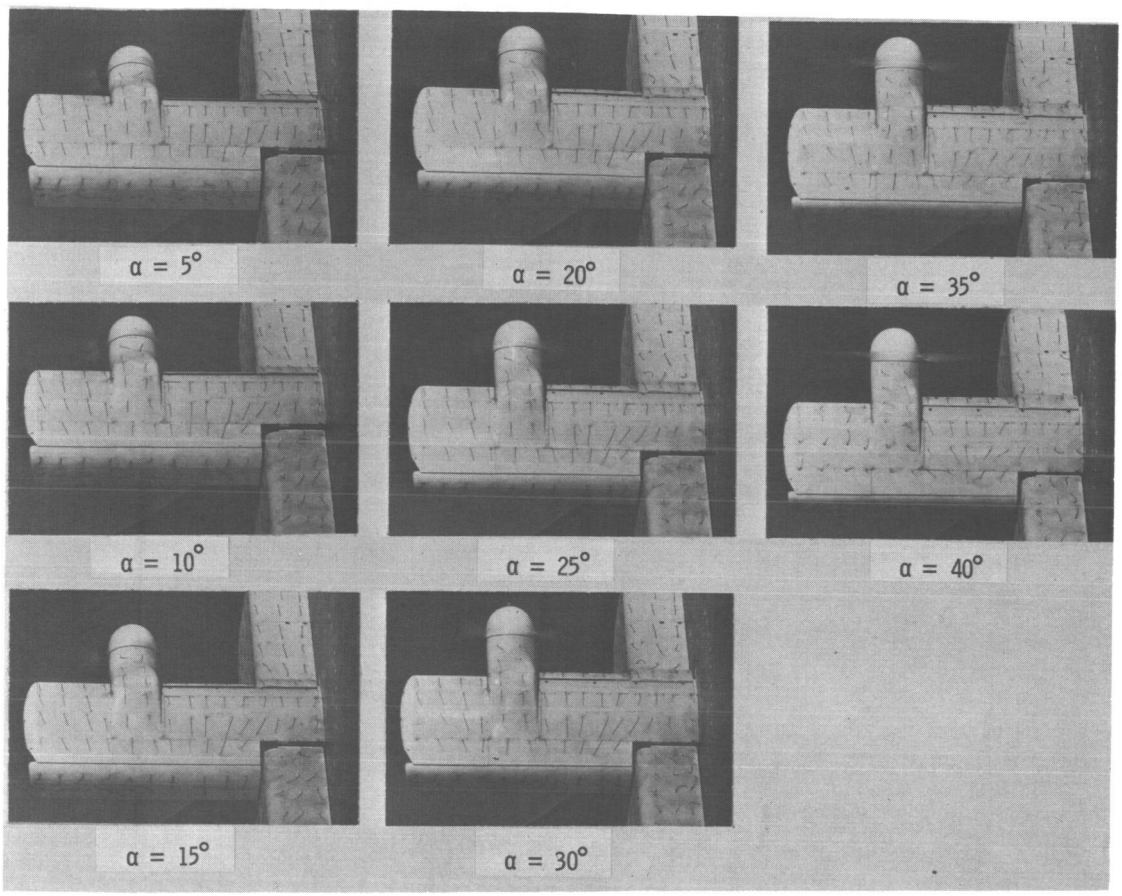
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 15.- Continued.



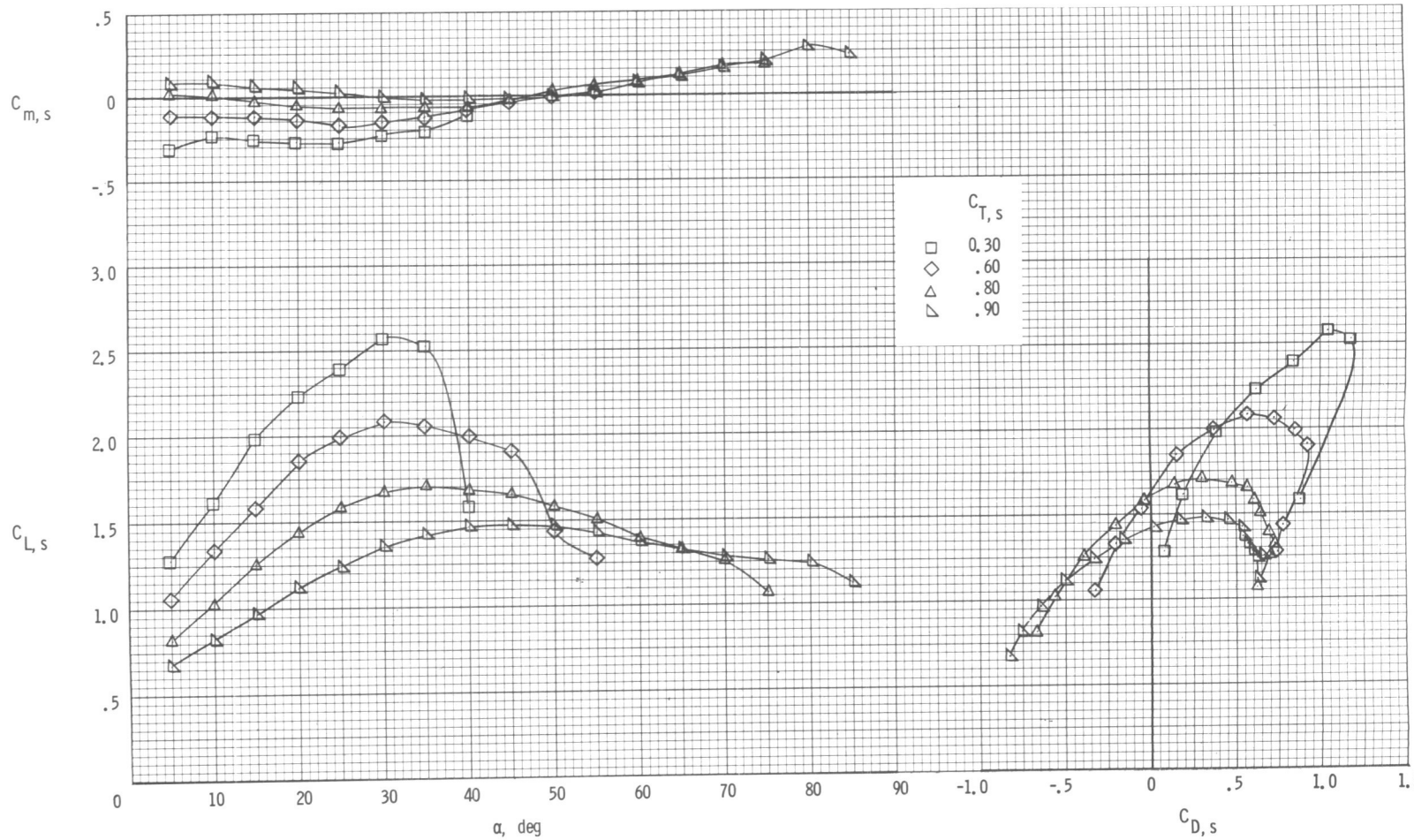
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 15.- Continued.



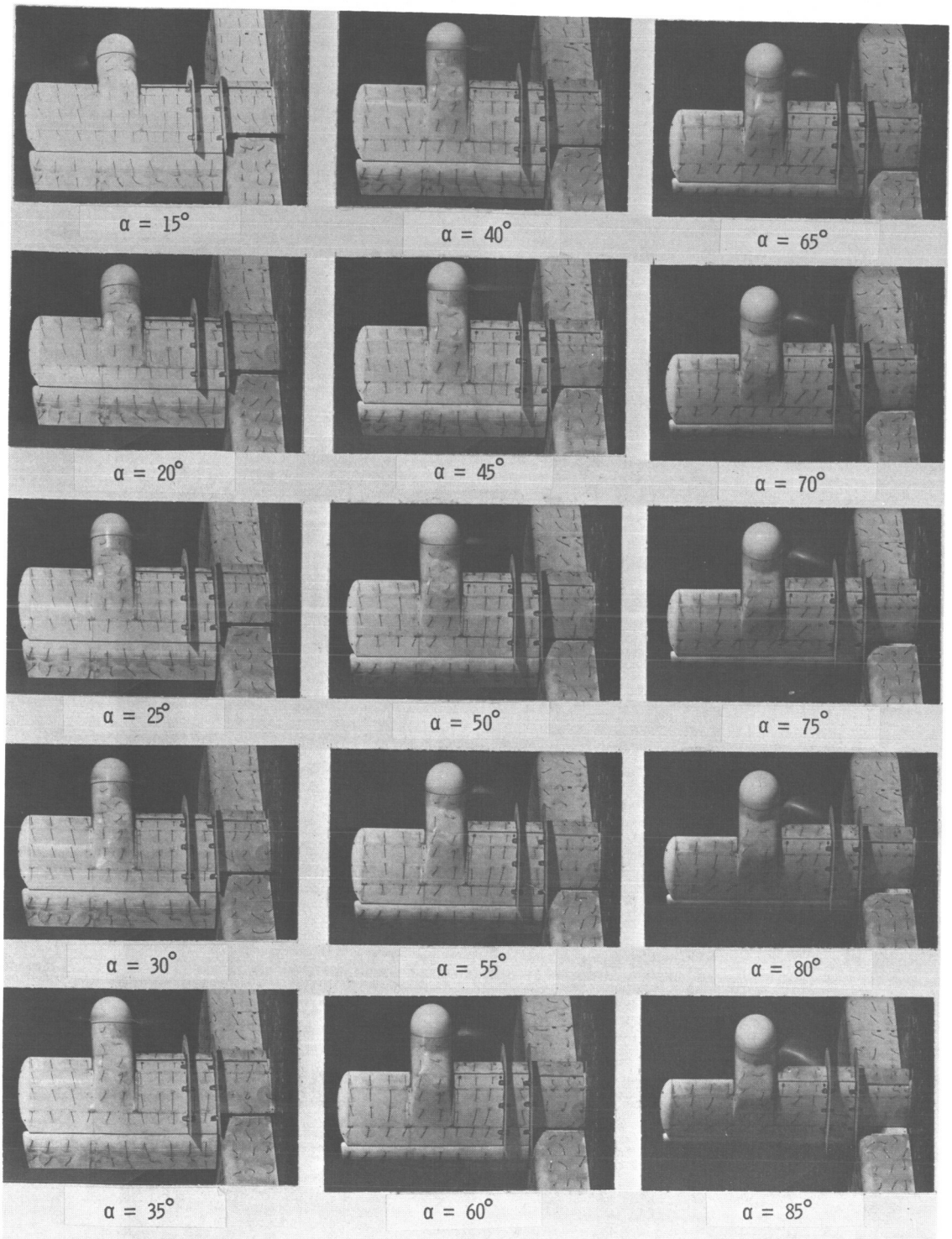
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 15.- Concluded.



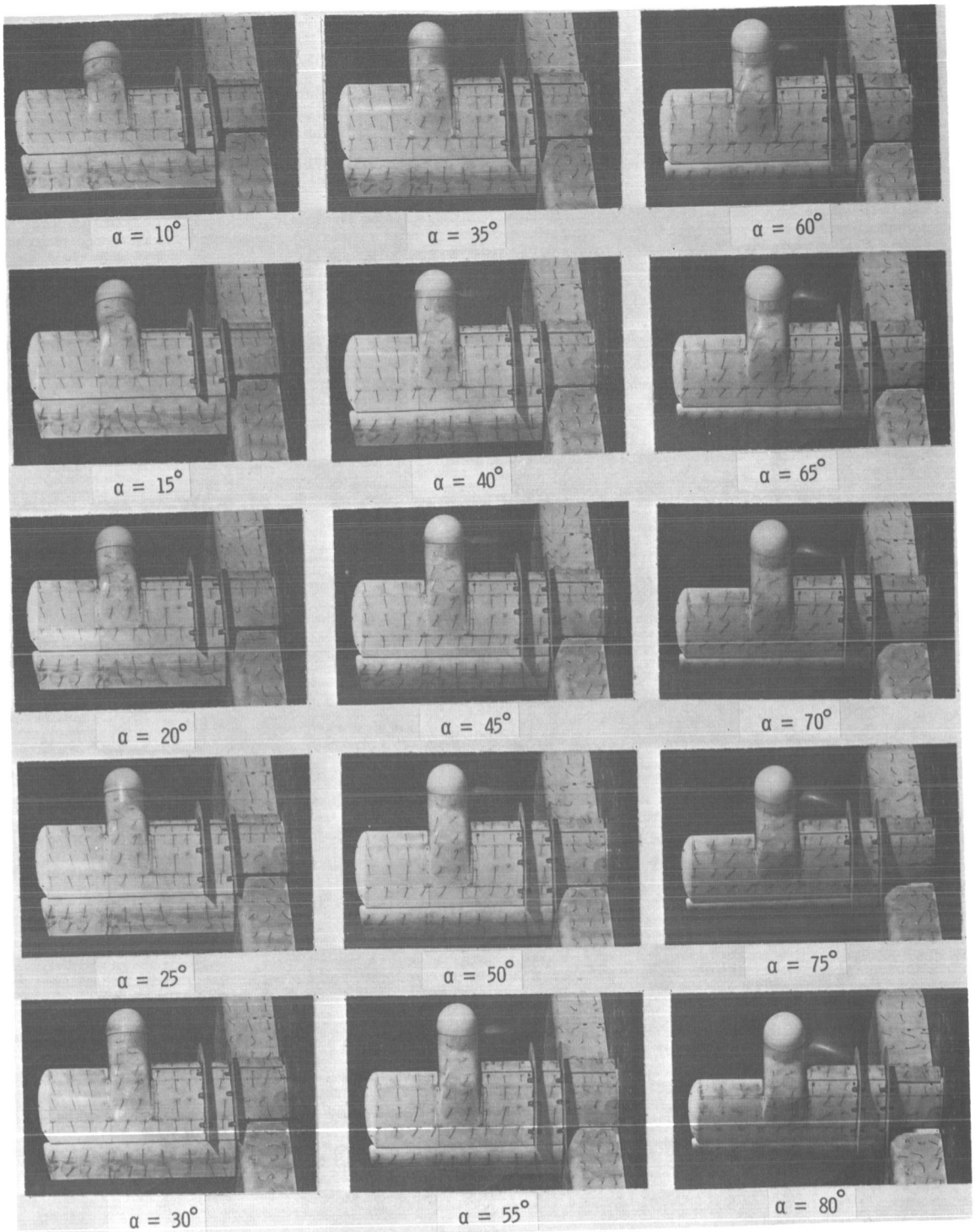
(a) Aerodynamic characteristics.

Figure 16.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, inboard slat on, fences on, and $\delta_f = 20^o$.



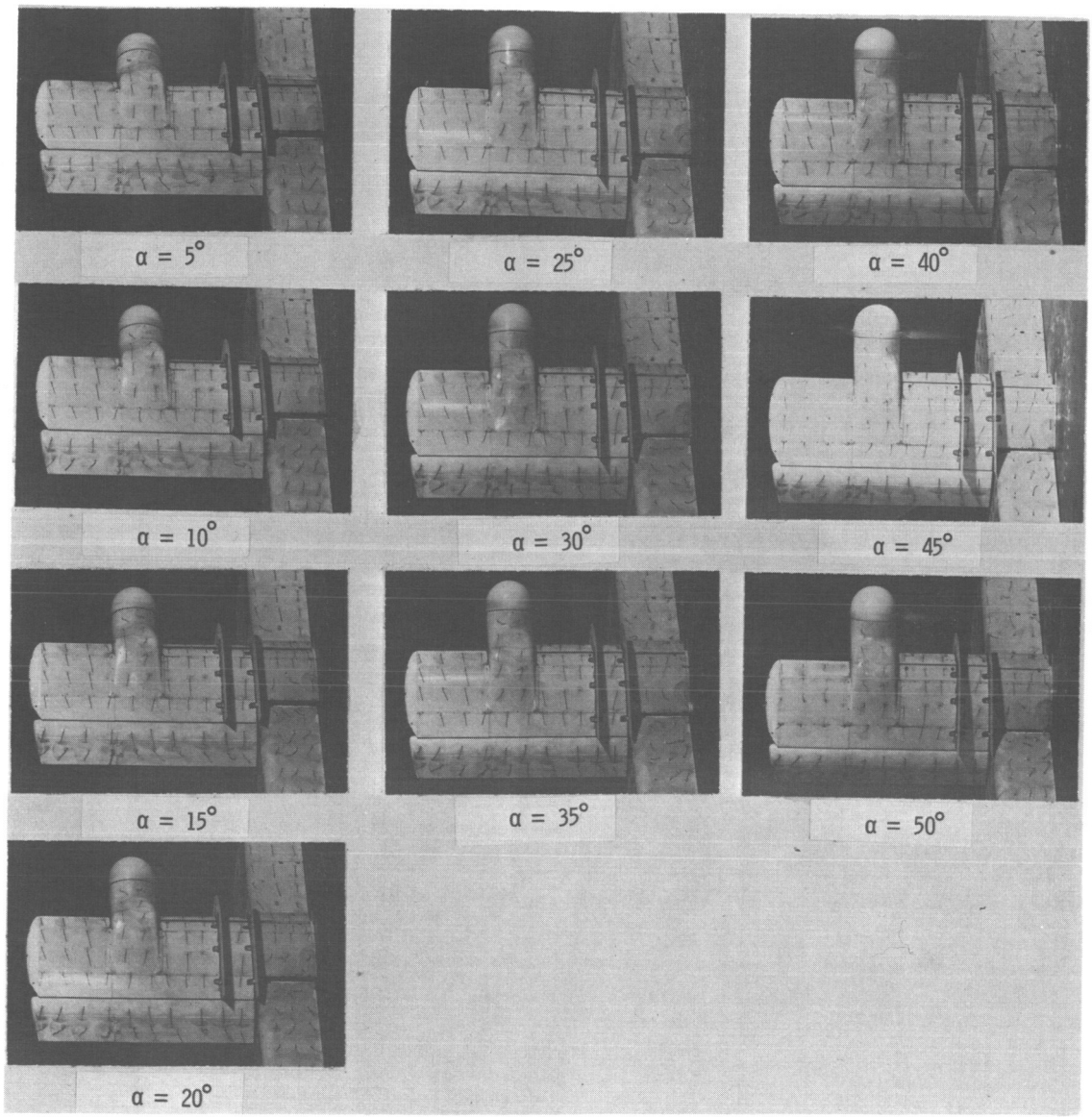
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 16.- Continued.



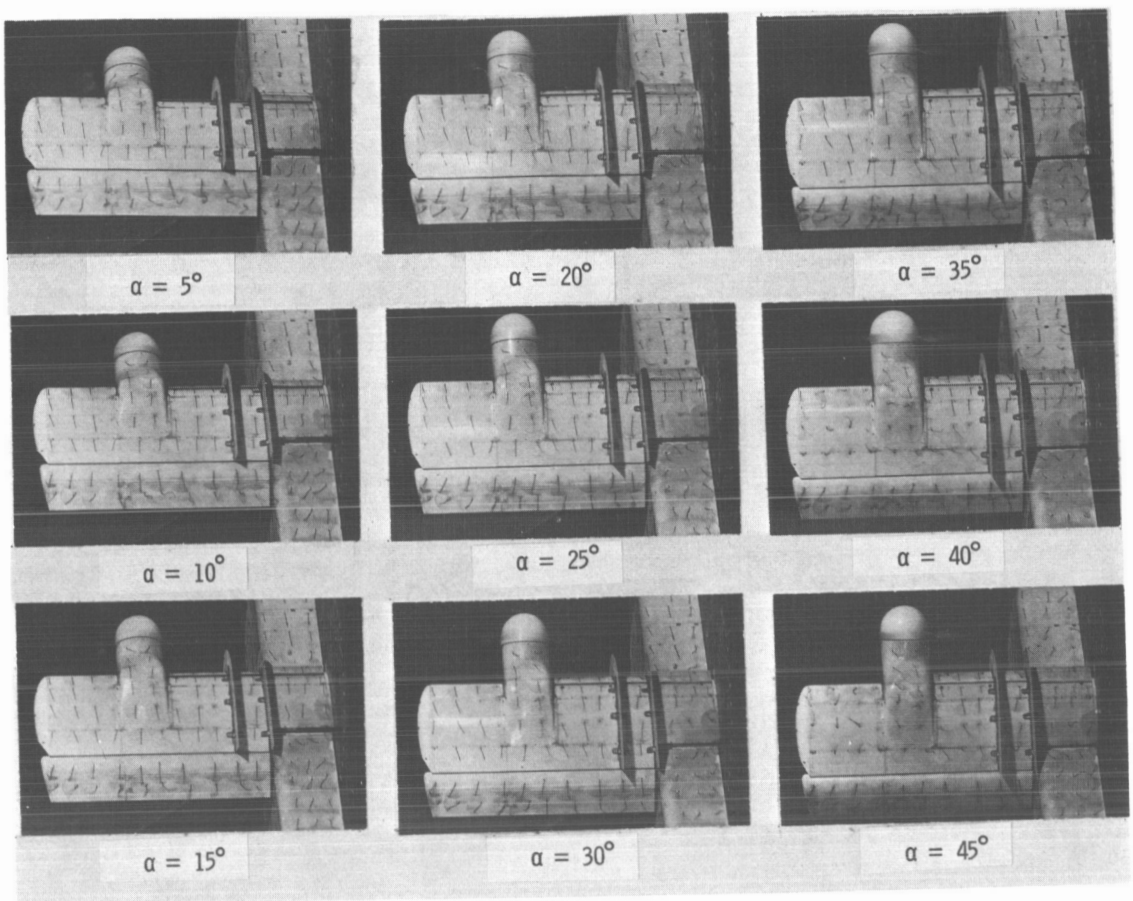
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 16.- Continued.



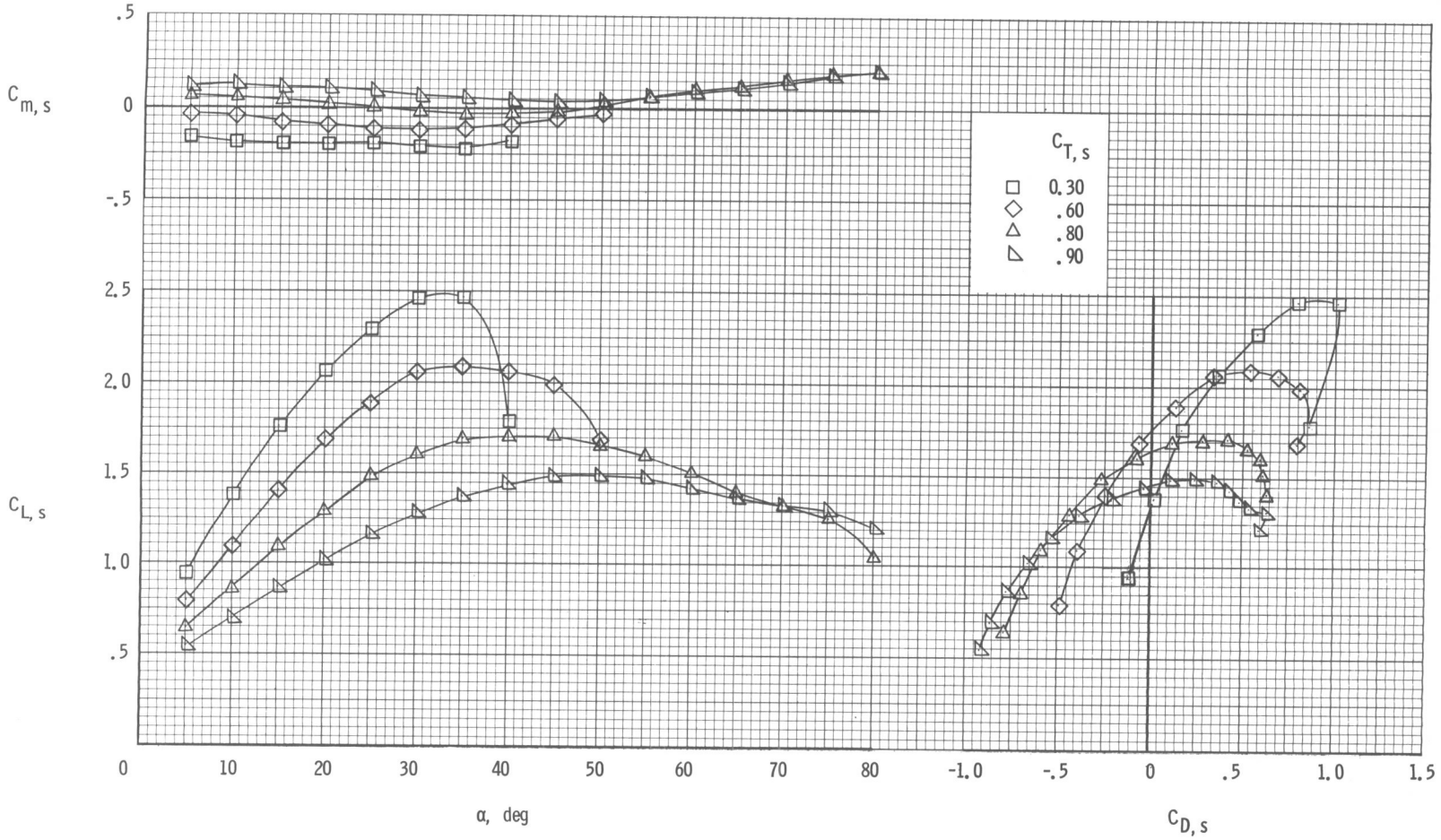
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 16.- Continued.



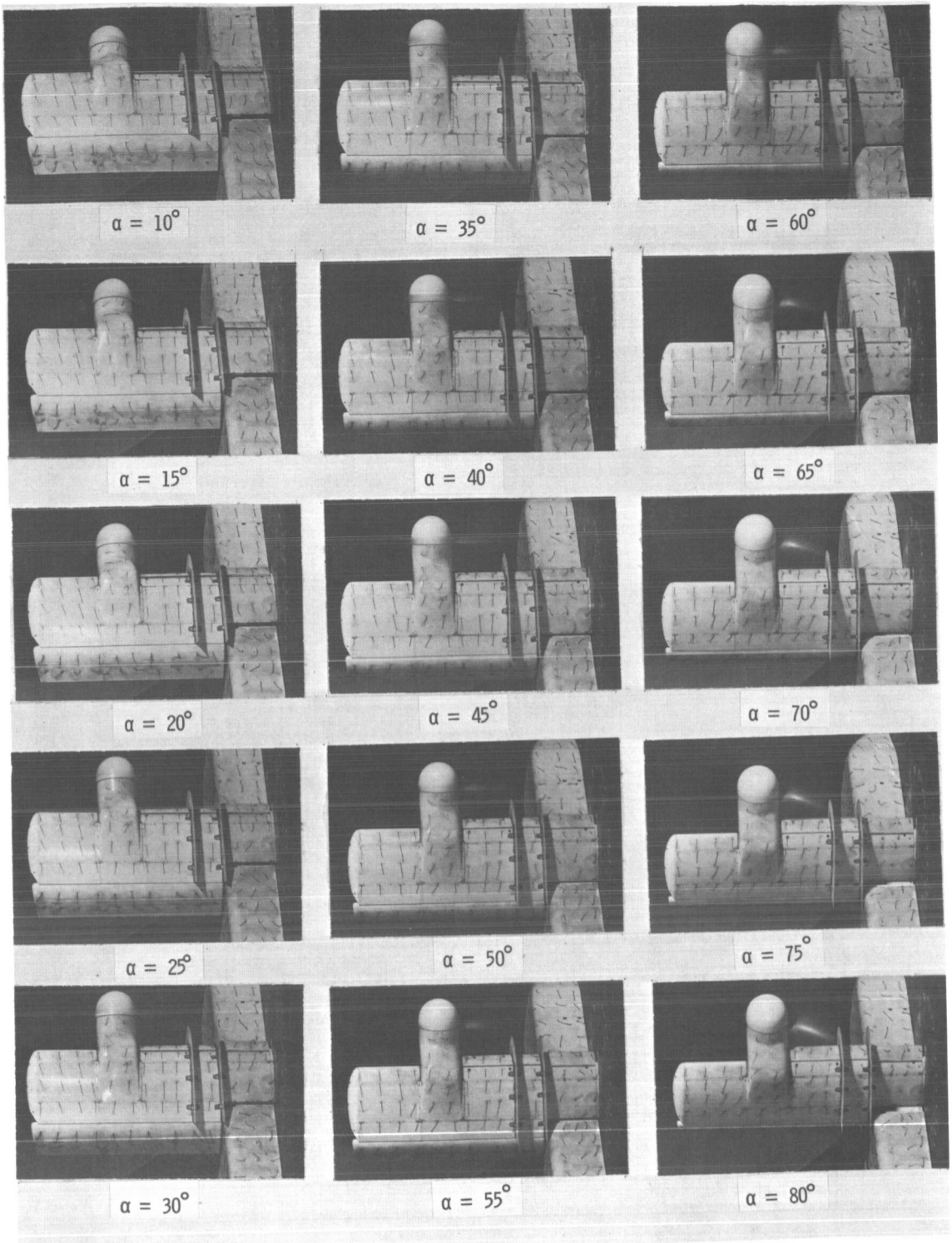
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 16.- Concluded.



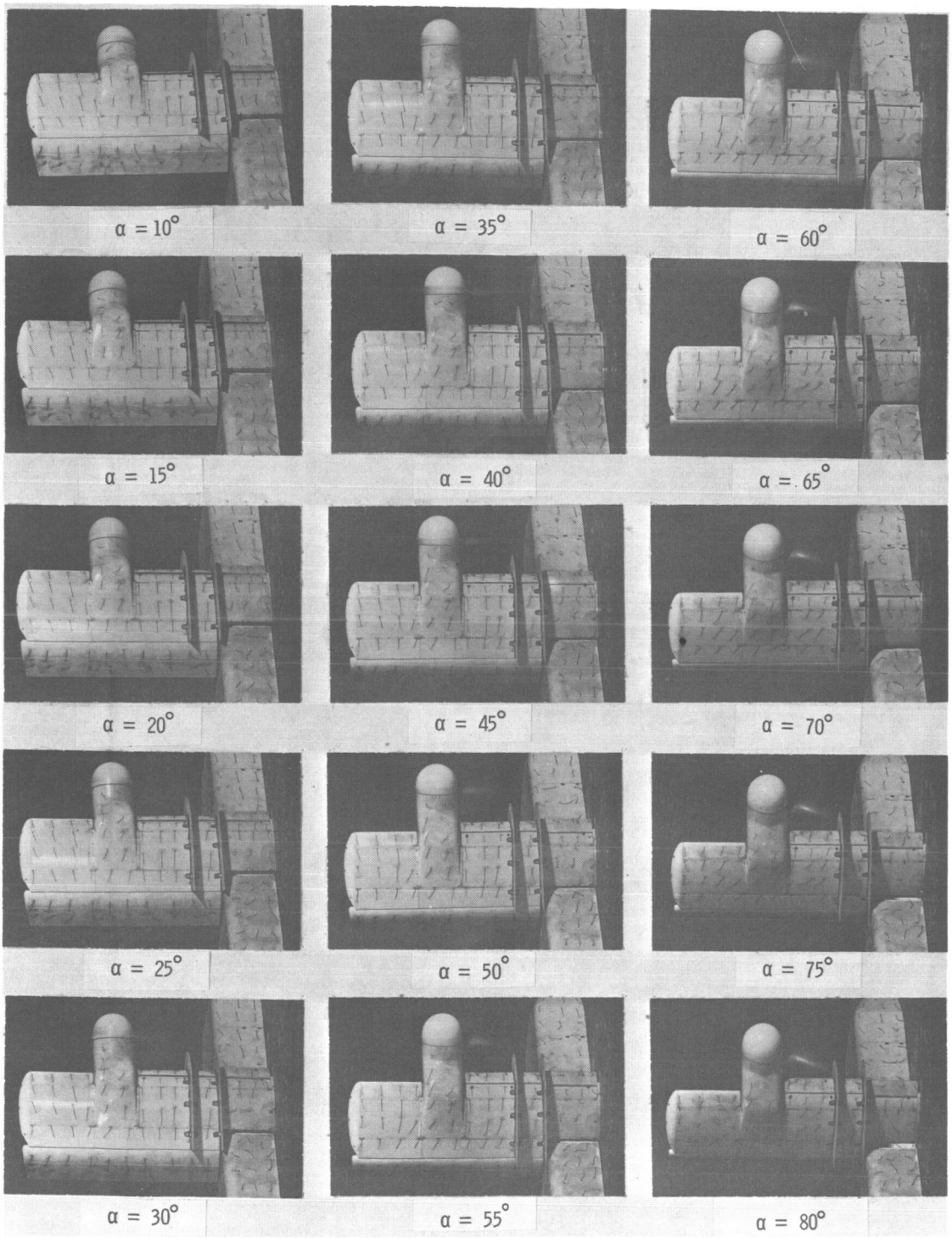
(a) Aerodynamic characteristics.

Figure 17.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, inboard slat on, fences on, and $\delta_f = 40^0$.



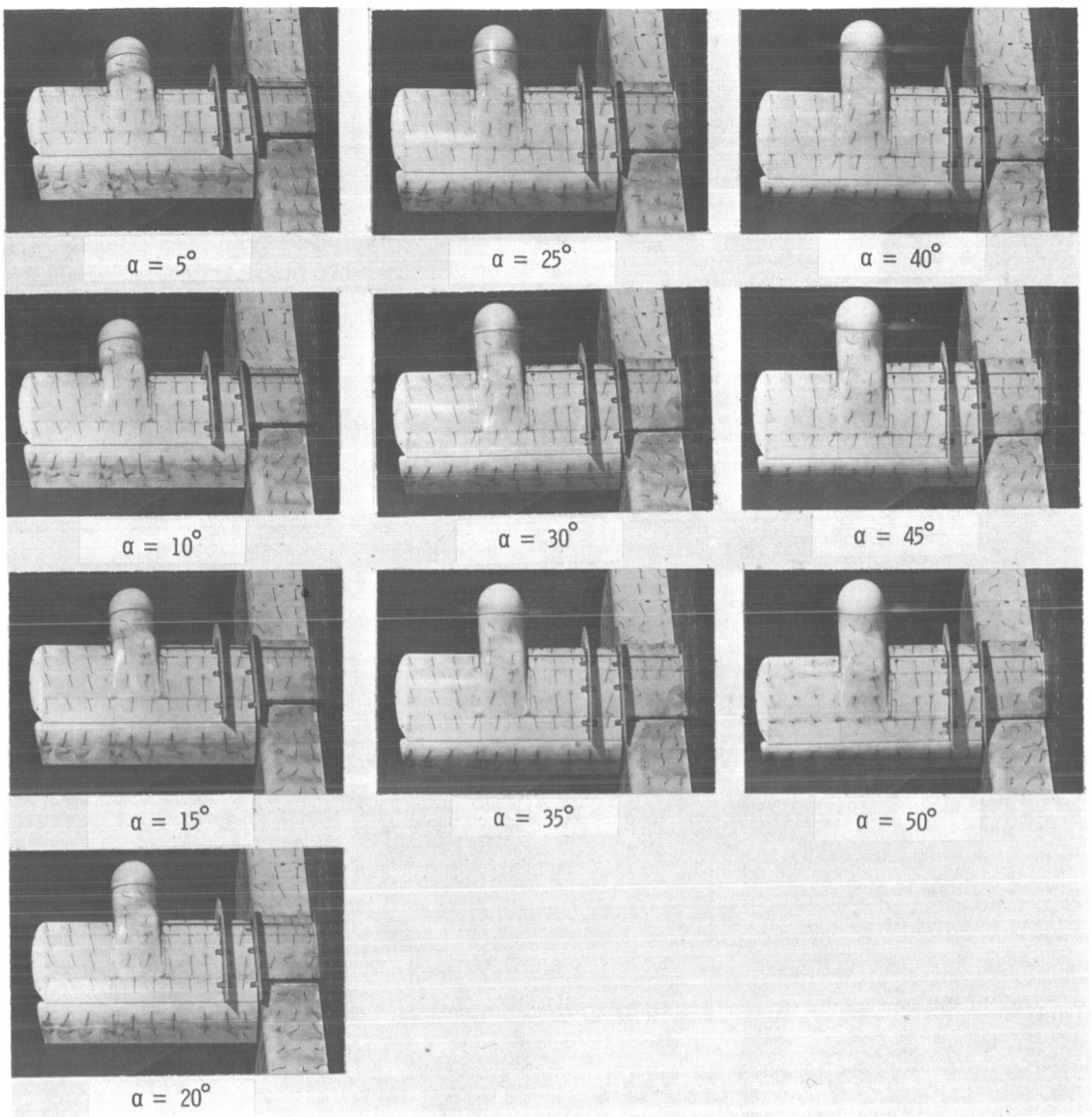
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 17.- Continued.



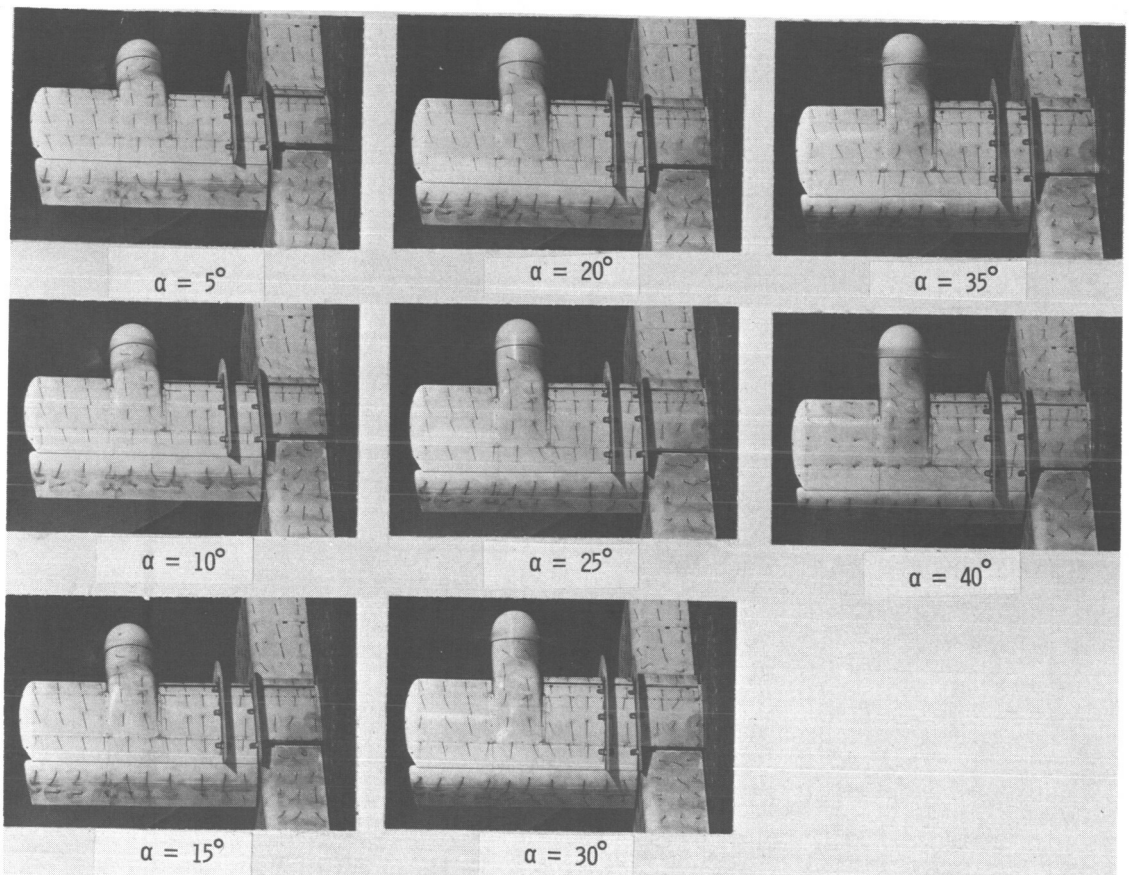
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 17.- Continued.



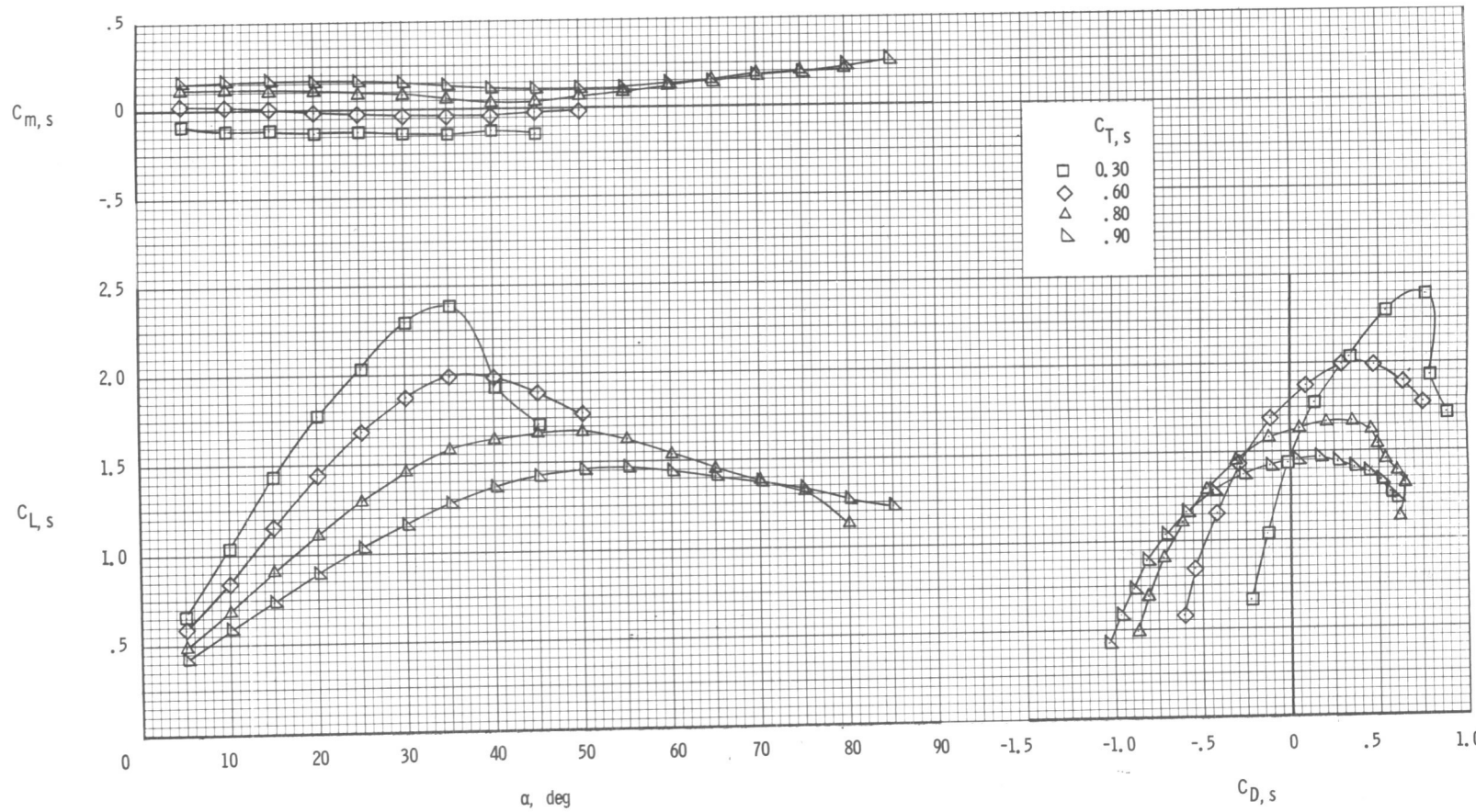
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 17.- Continued.



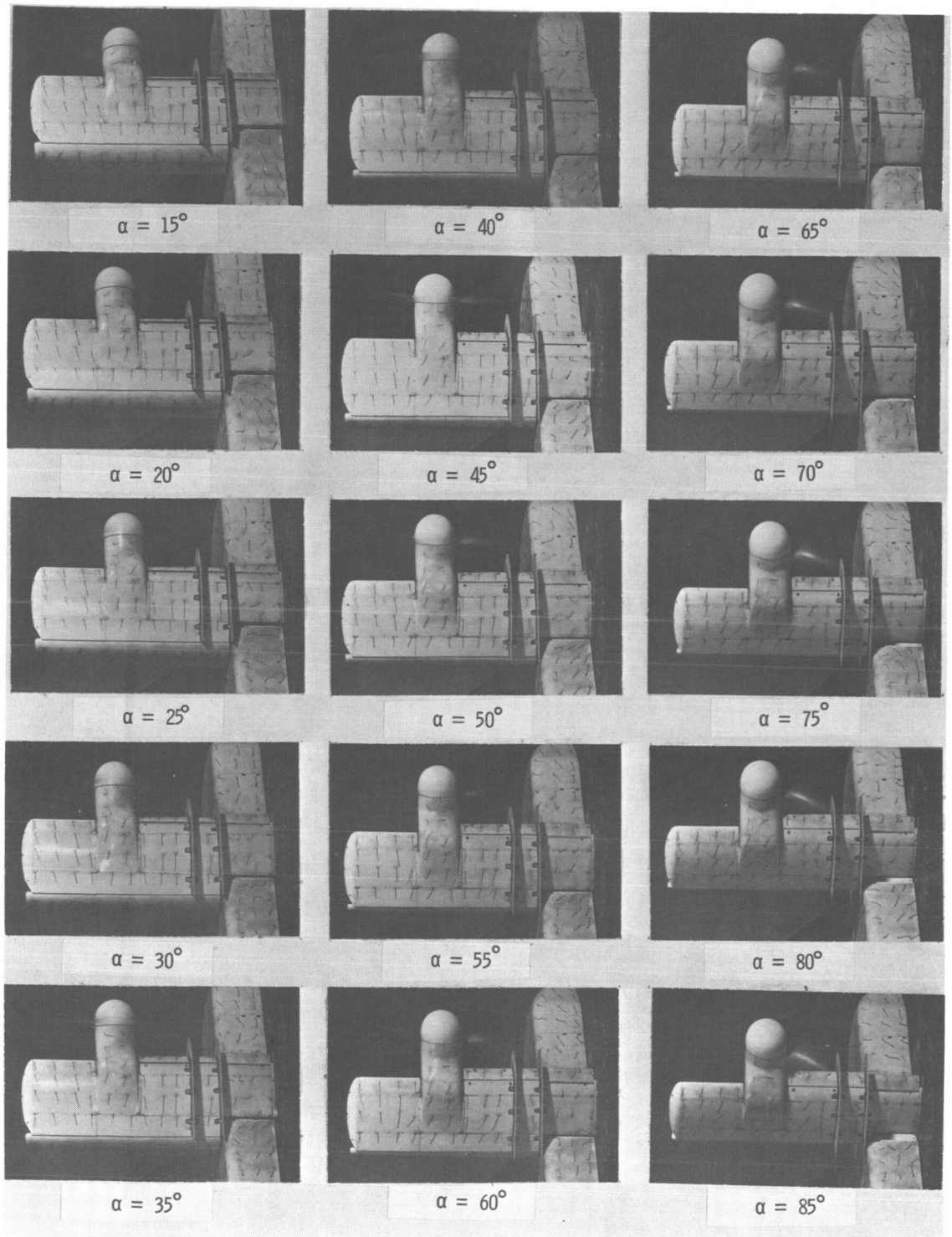
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 17.- Concluded.



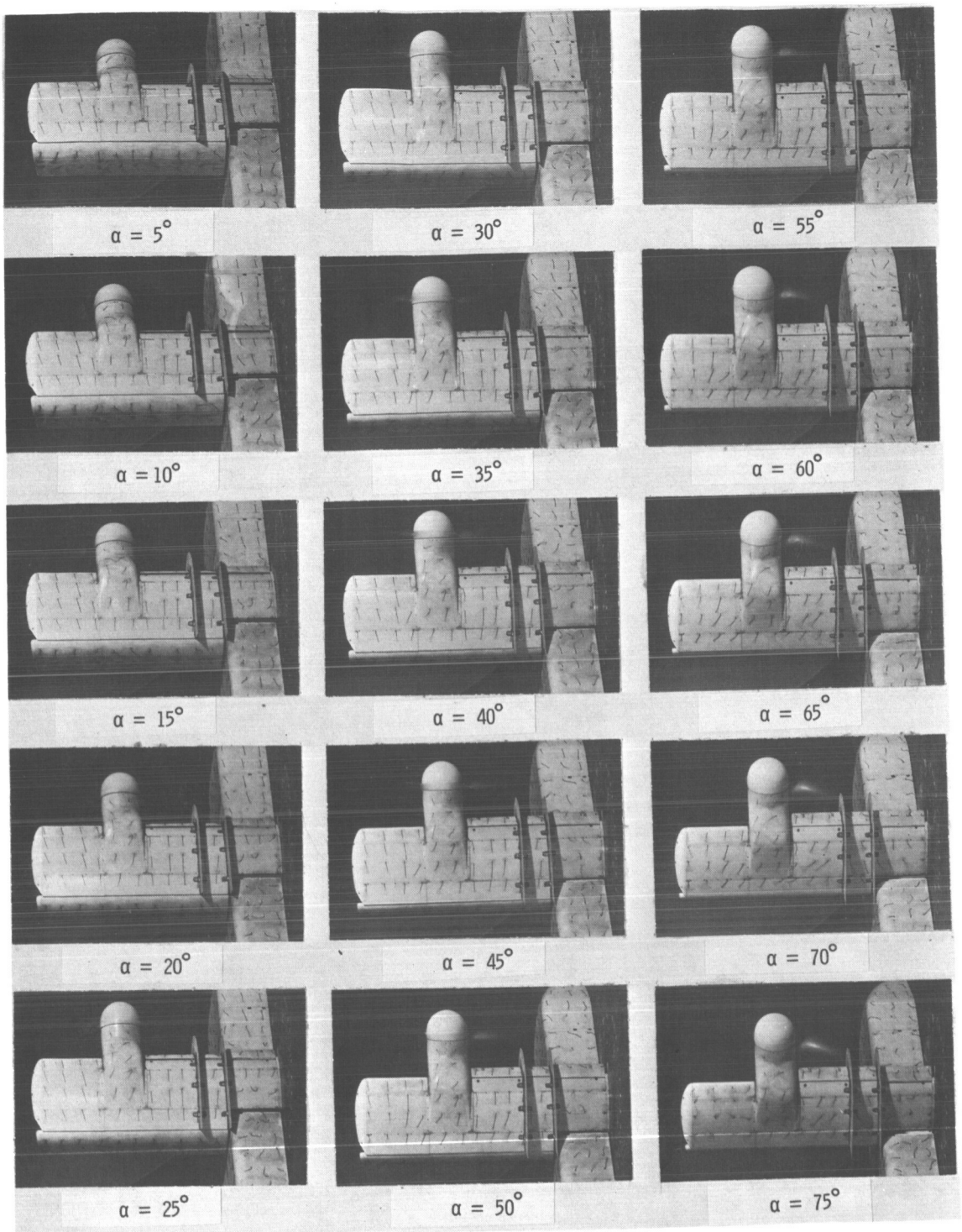
(a) Aerodynamic characteristics.

Figure 18.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, inboard slat on, fences on, and $\delta_f = 60^o$.



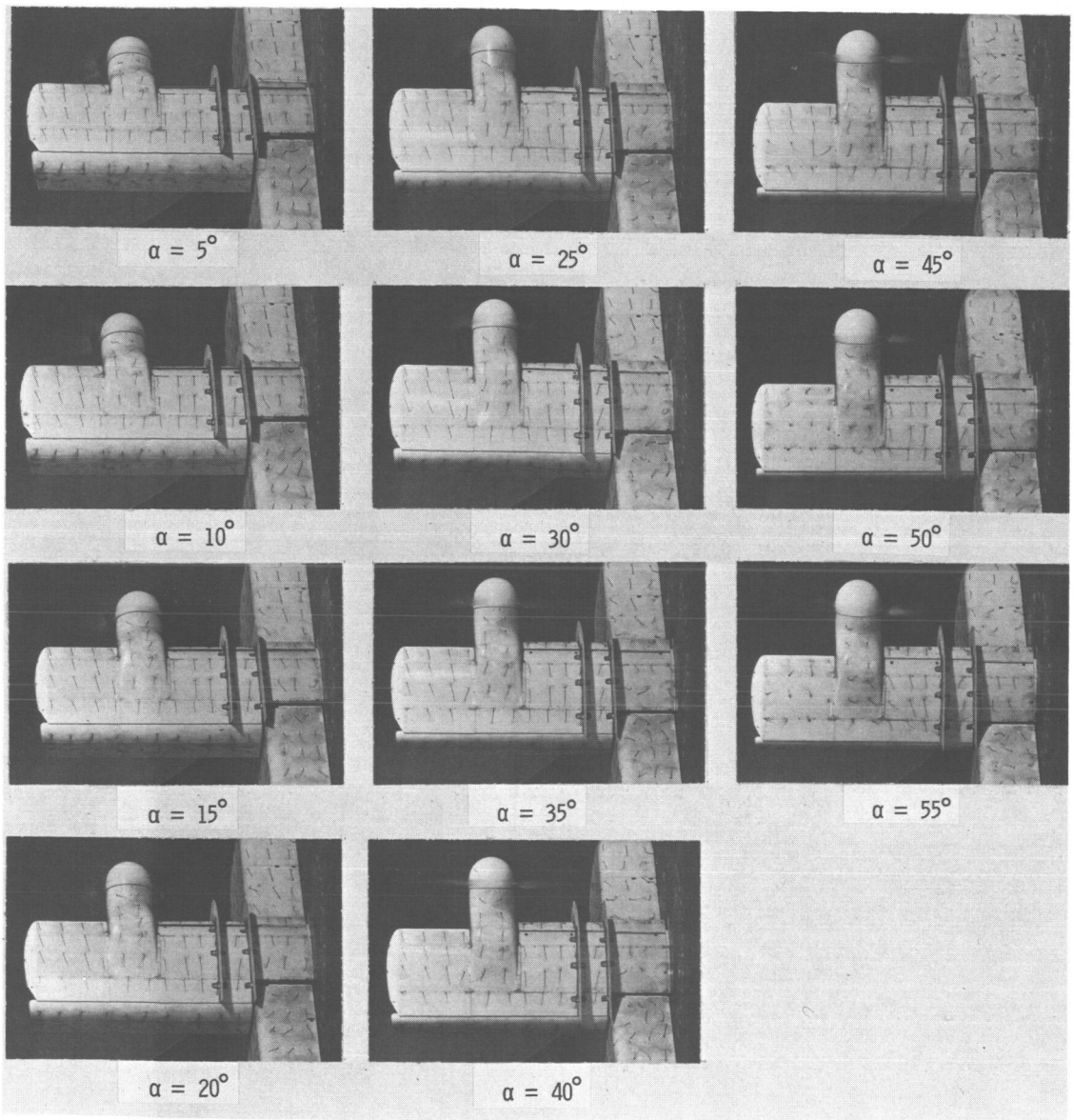
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 18.- Continued.



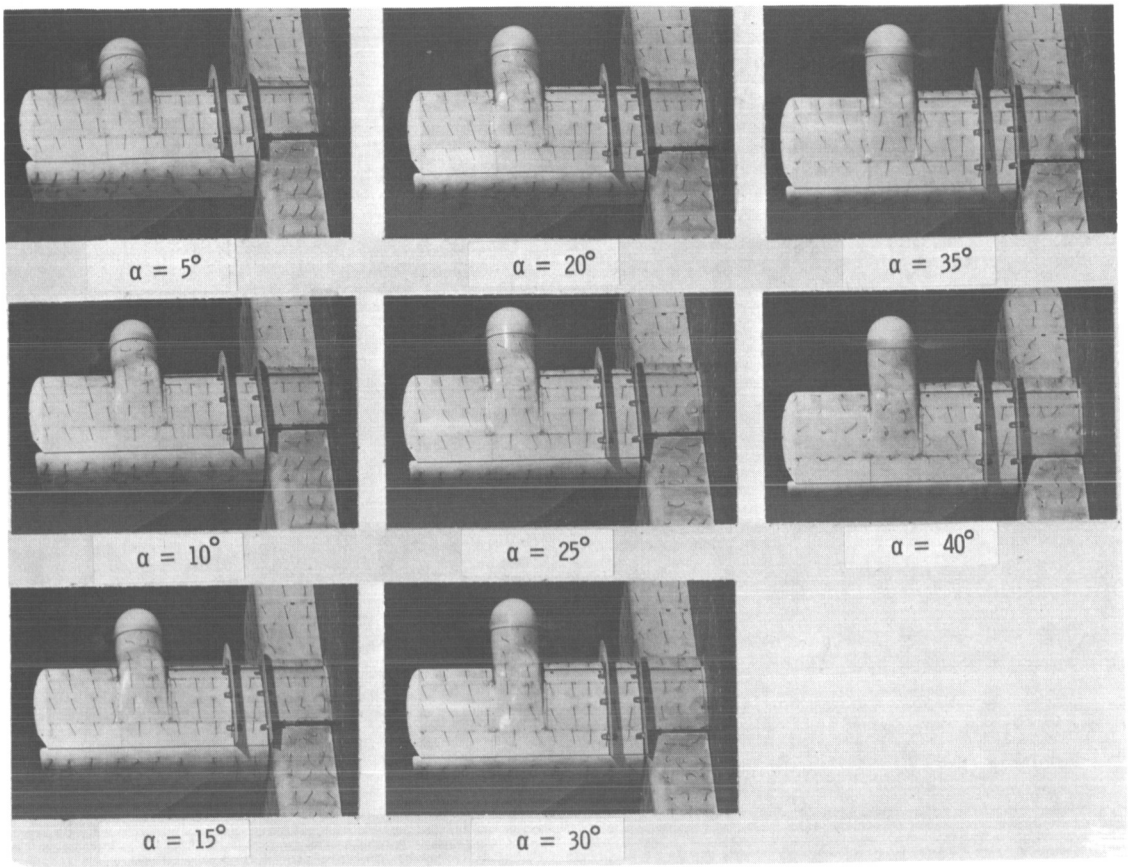
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 18.- Continued.



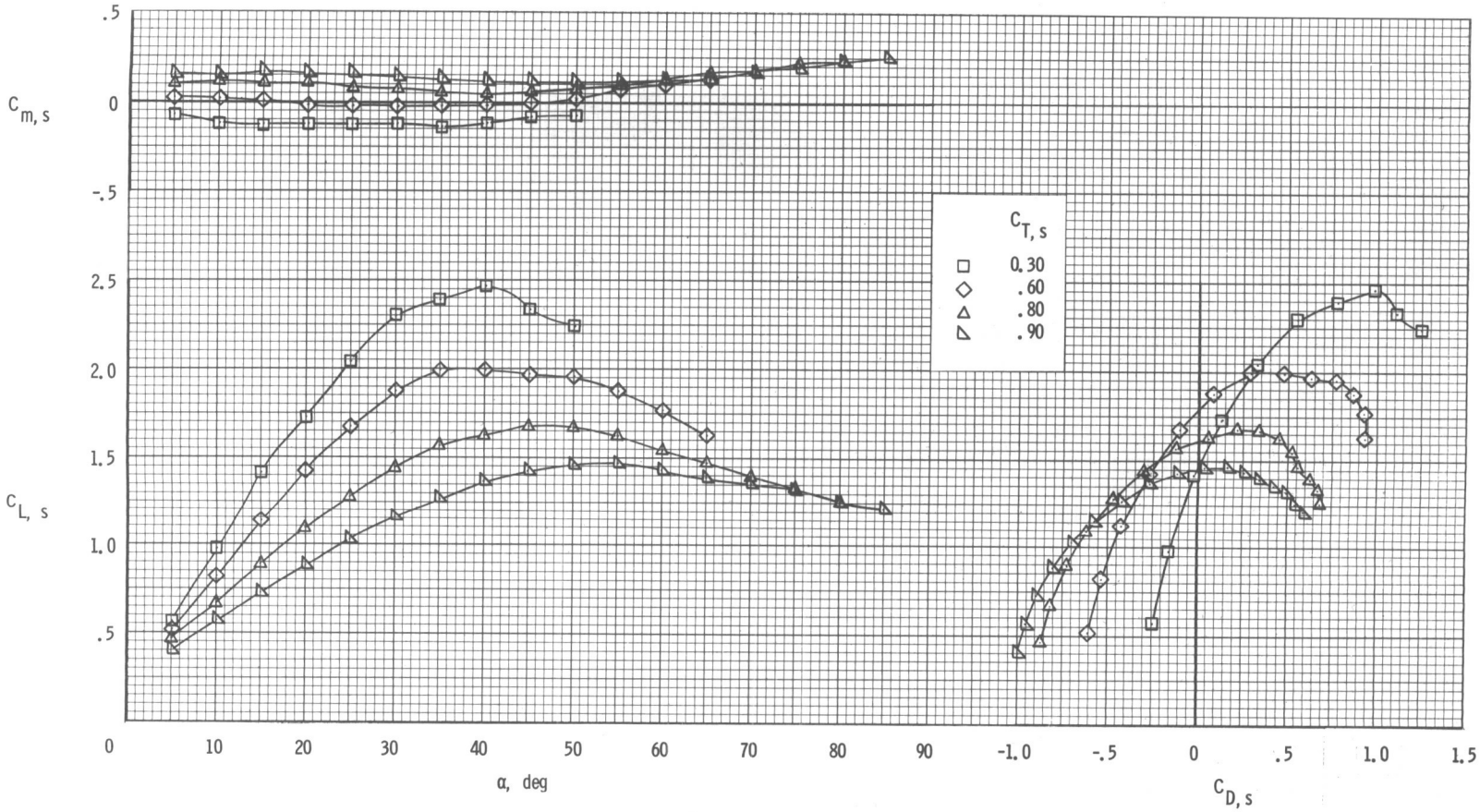
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 18.- Continued.



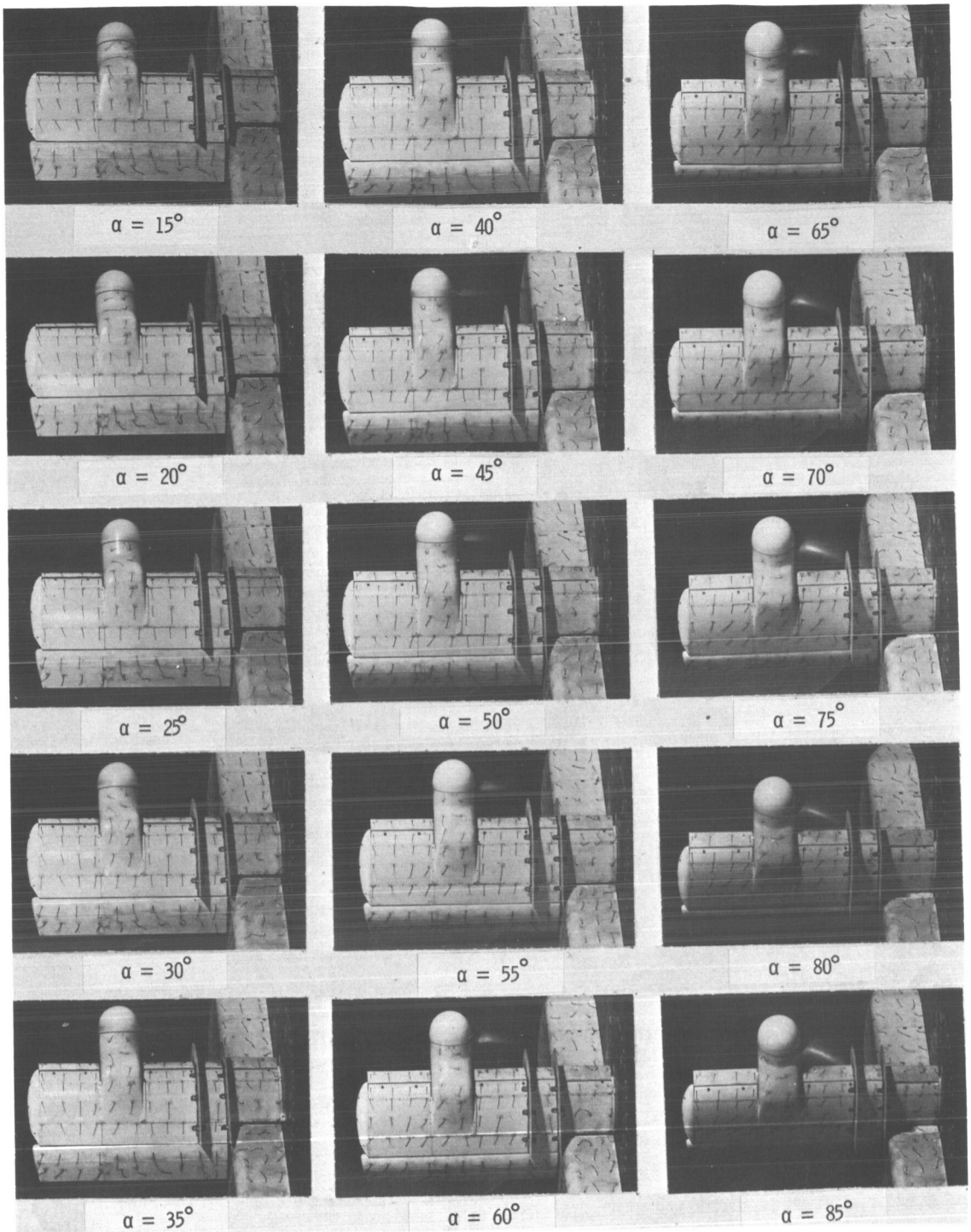
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 18.- Concluded.



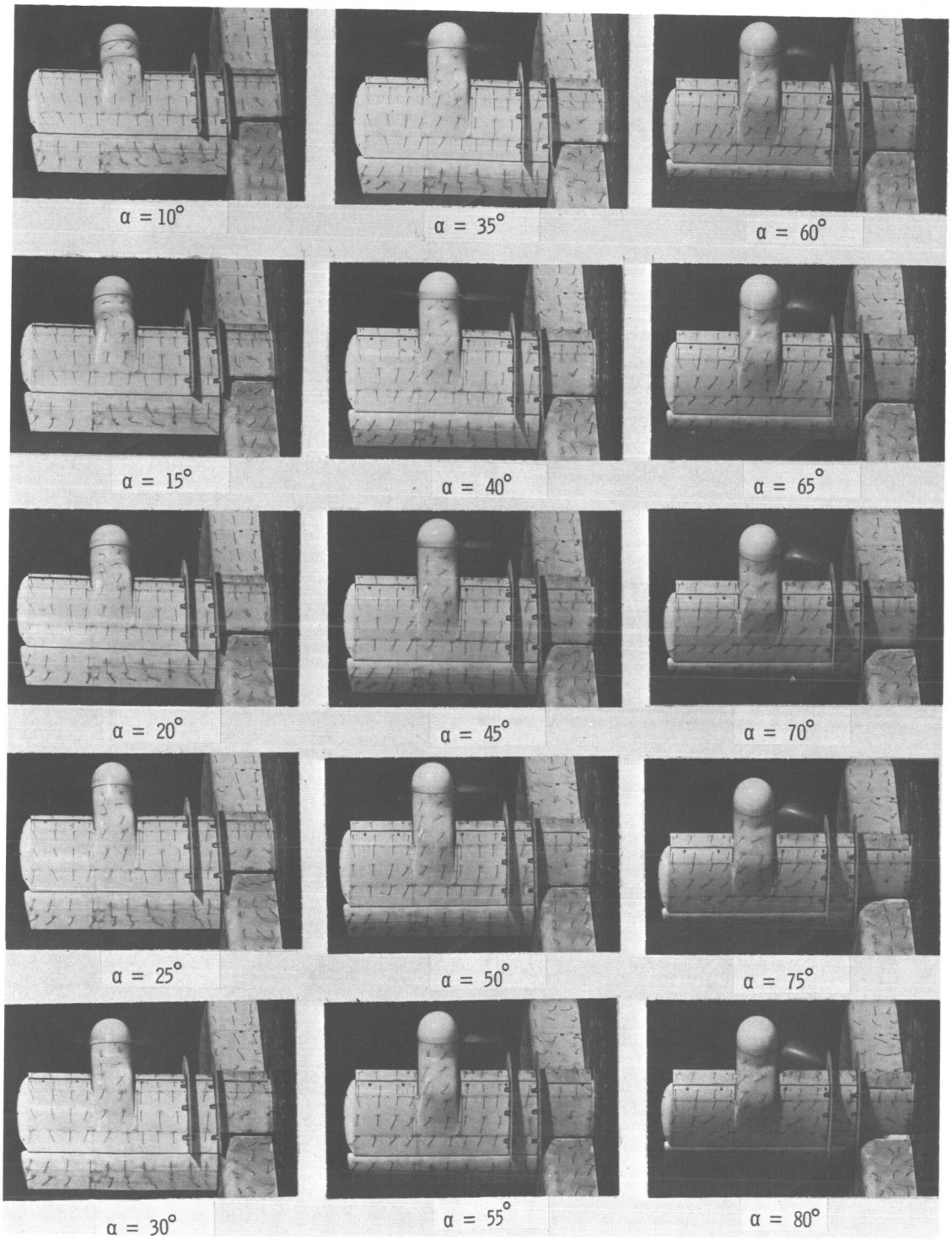
(a) Aerodynamic characteristics.

Figure 19.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, full-span slat on, fences on, and $\delta_f = 20^o$.



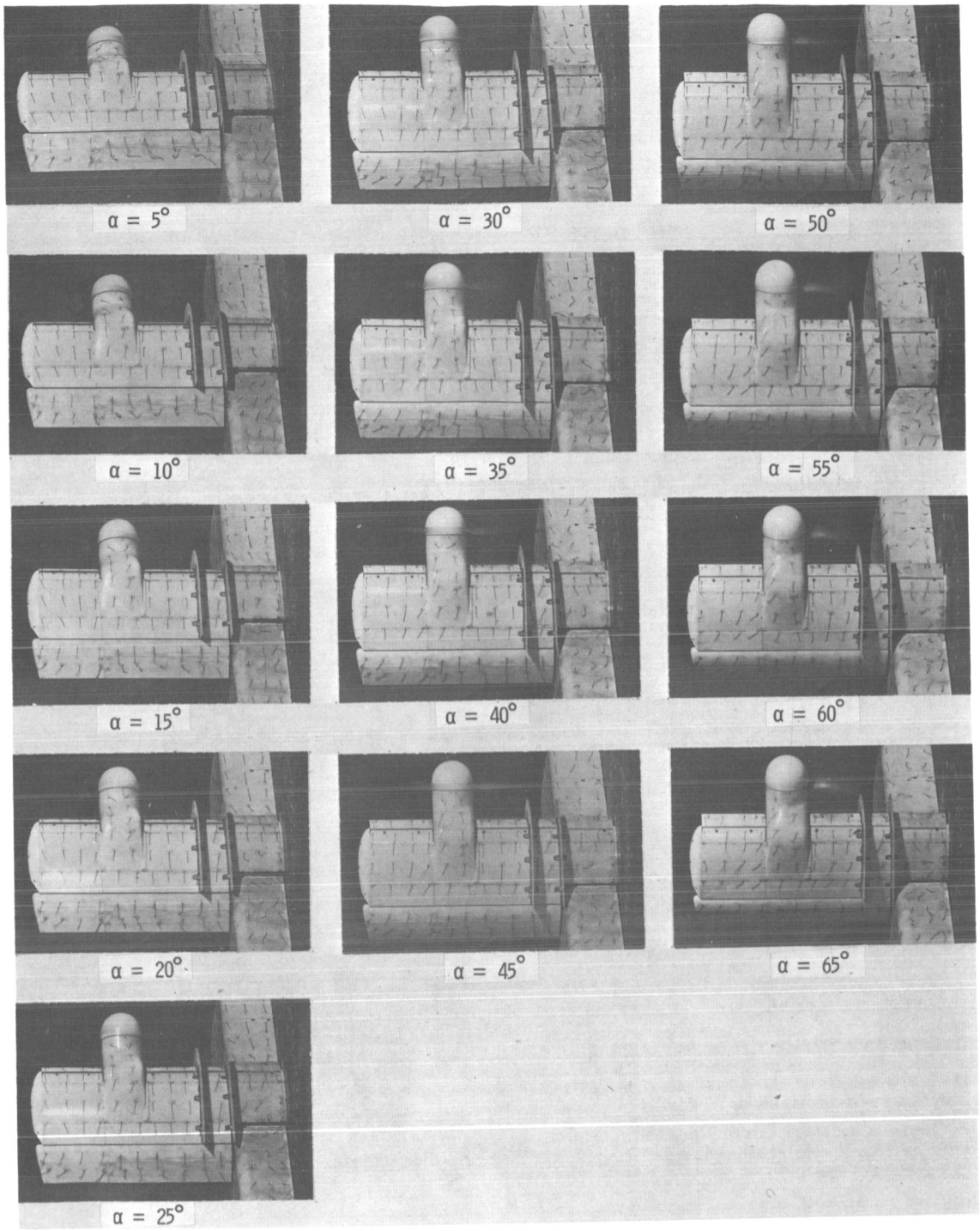
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 19.- Continued.



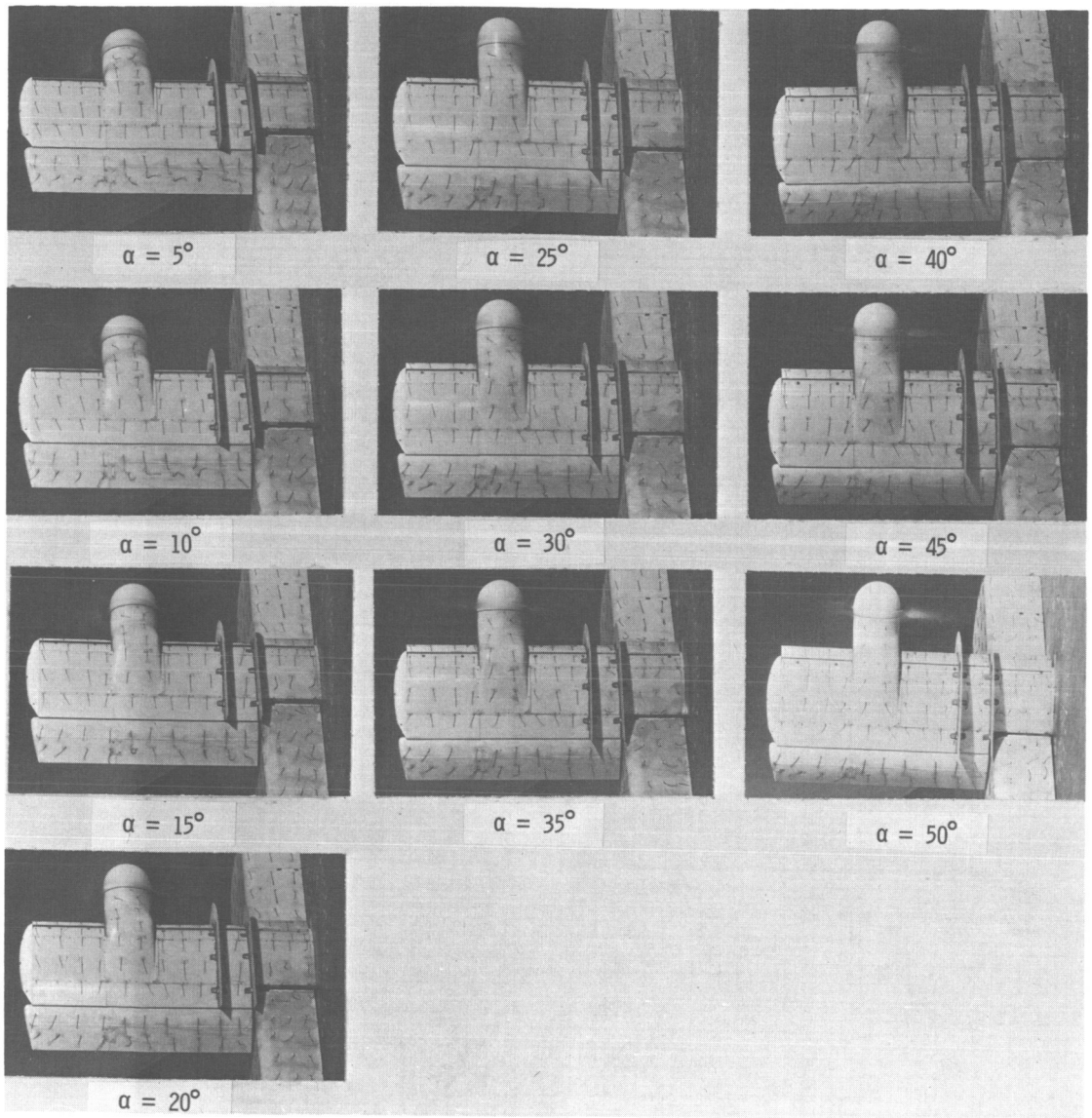
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 19.- Continued.



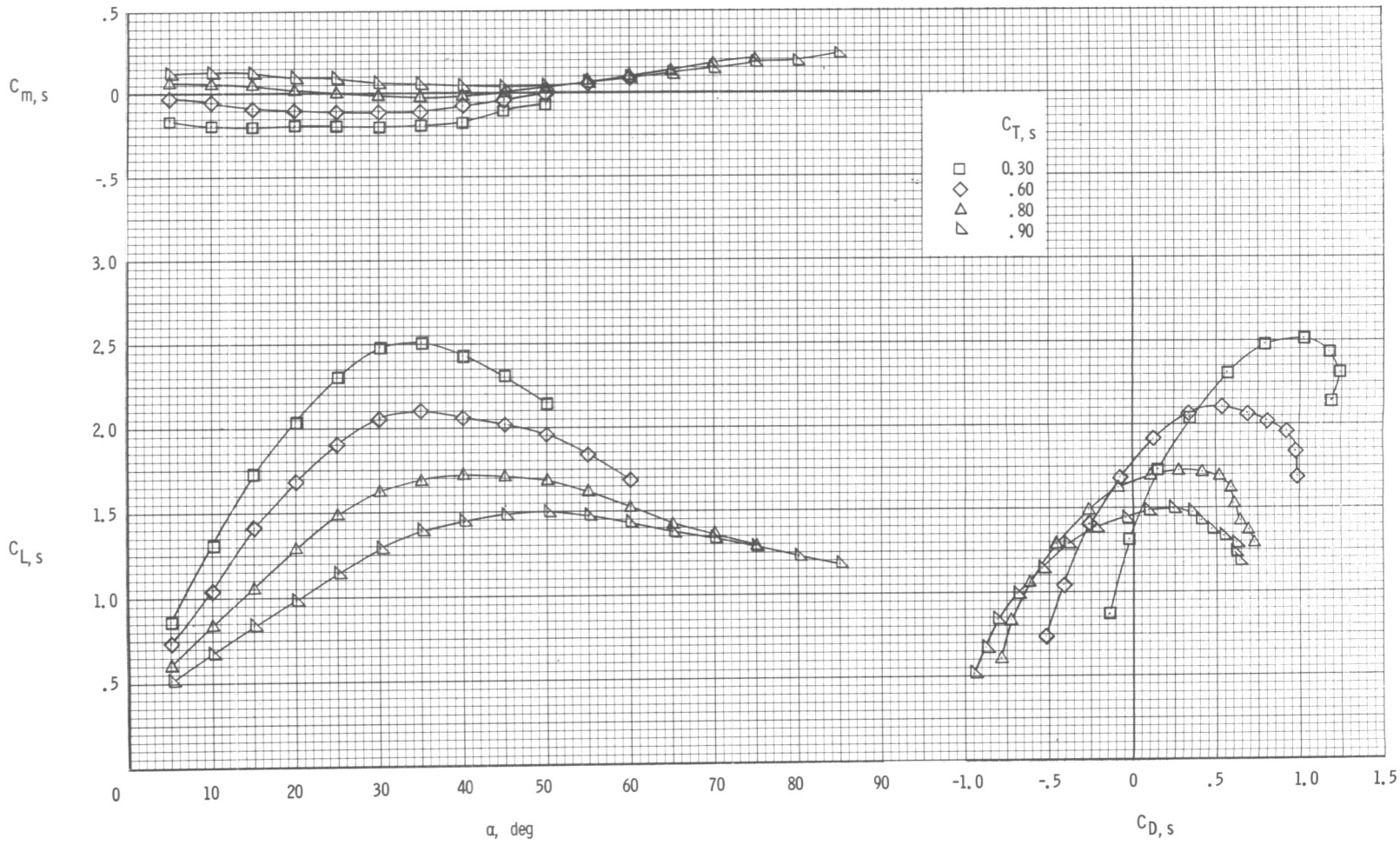
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 19.- Continued.



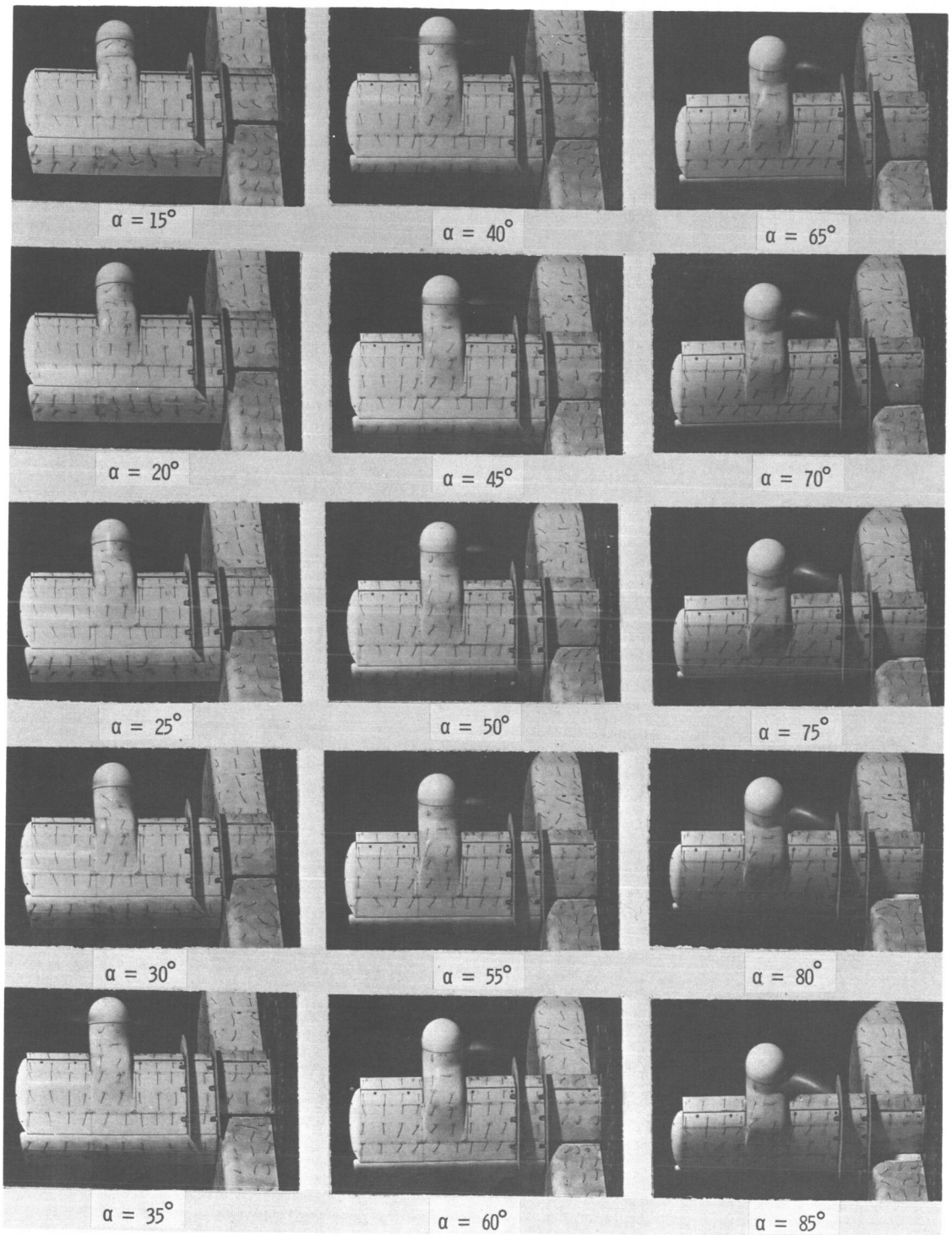
(e) Flow characteristics; $C_{T,s} = 0.30$.

Figure 19.- Concluded.



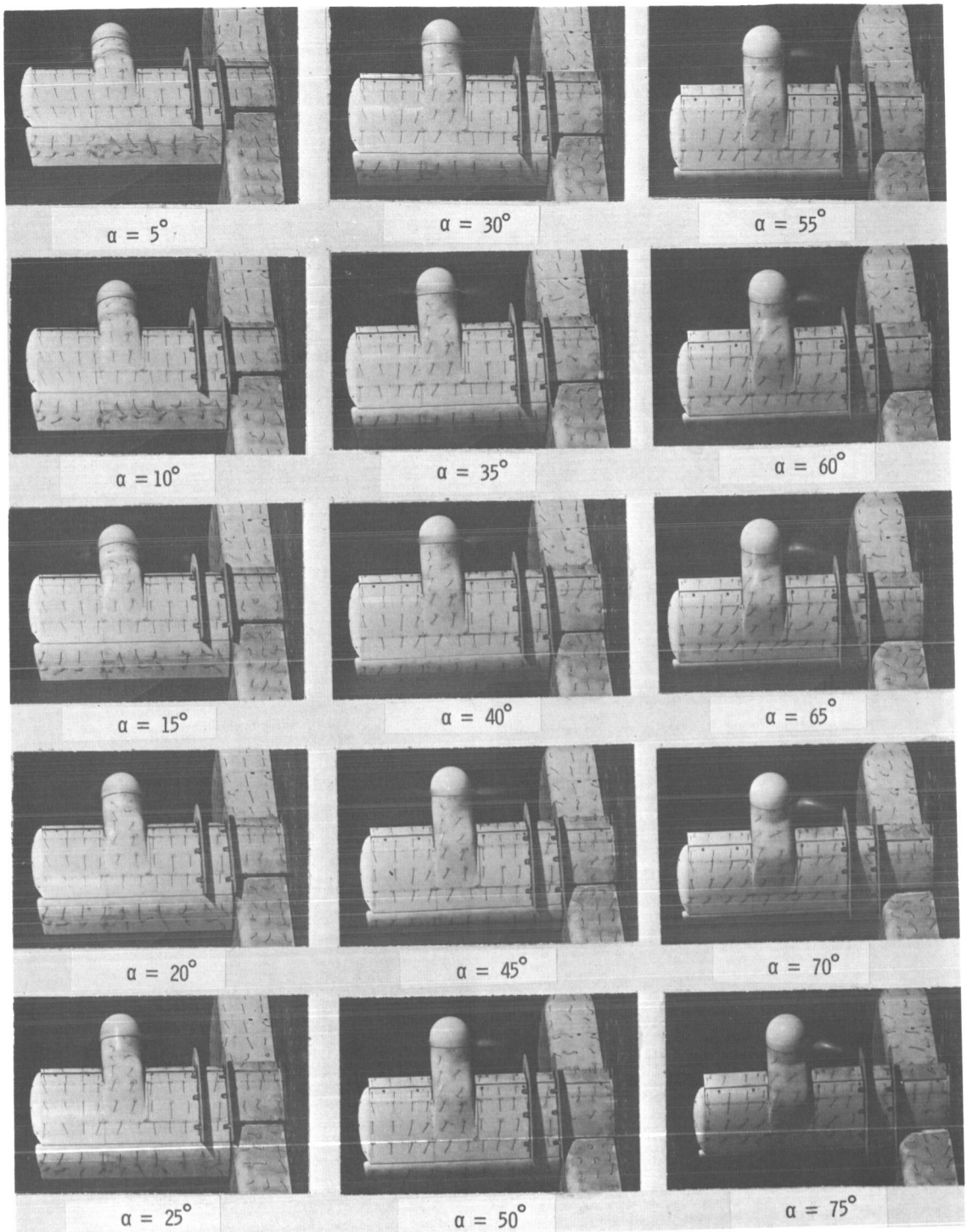
(a) Aerodynamic characteristics.

Figure 20.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, full-span slat on, fences on, and $\delta_f = 40^0$.



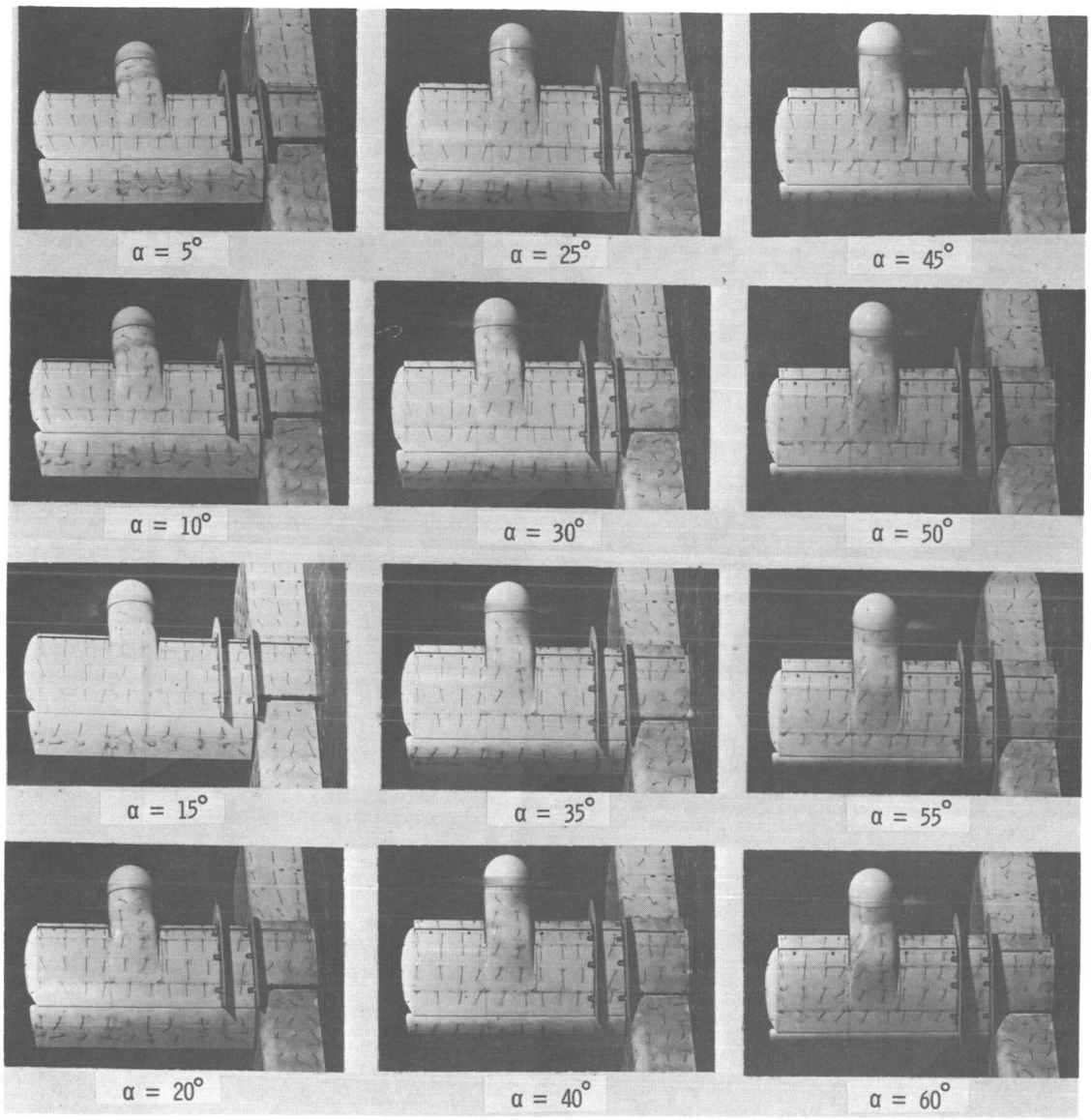
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 20.- Continued.



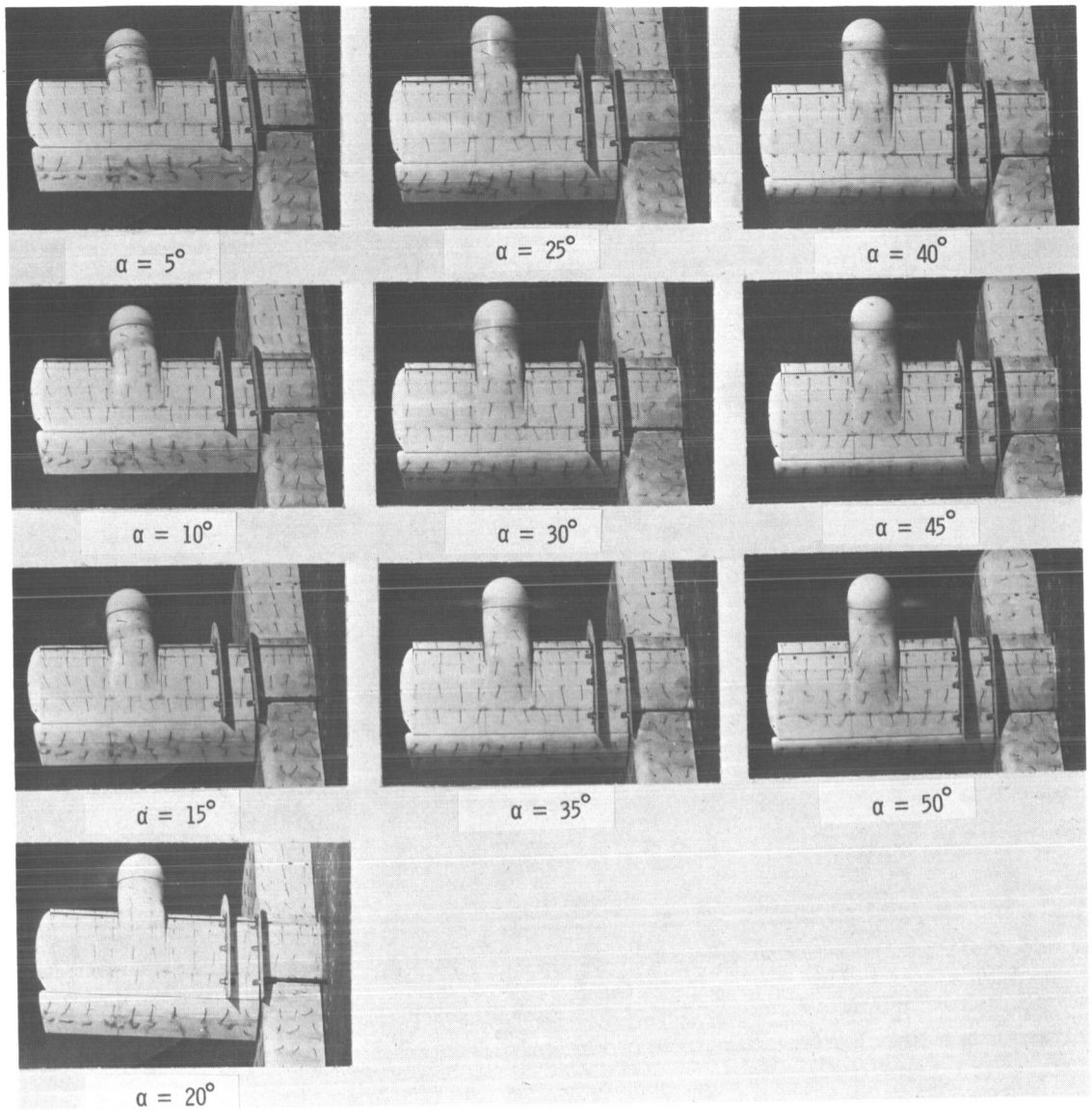
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 20.- Continued.



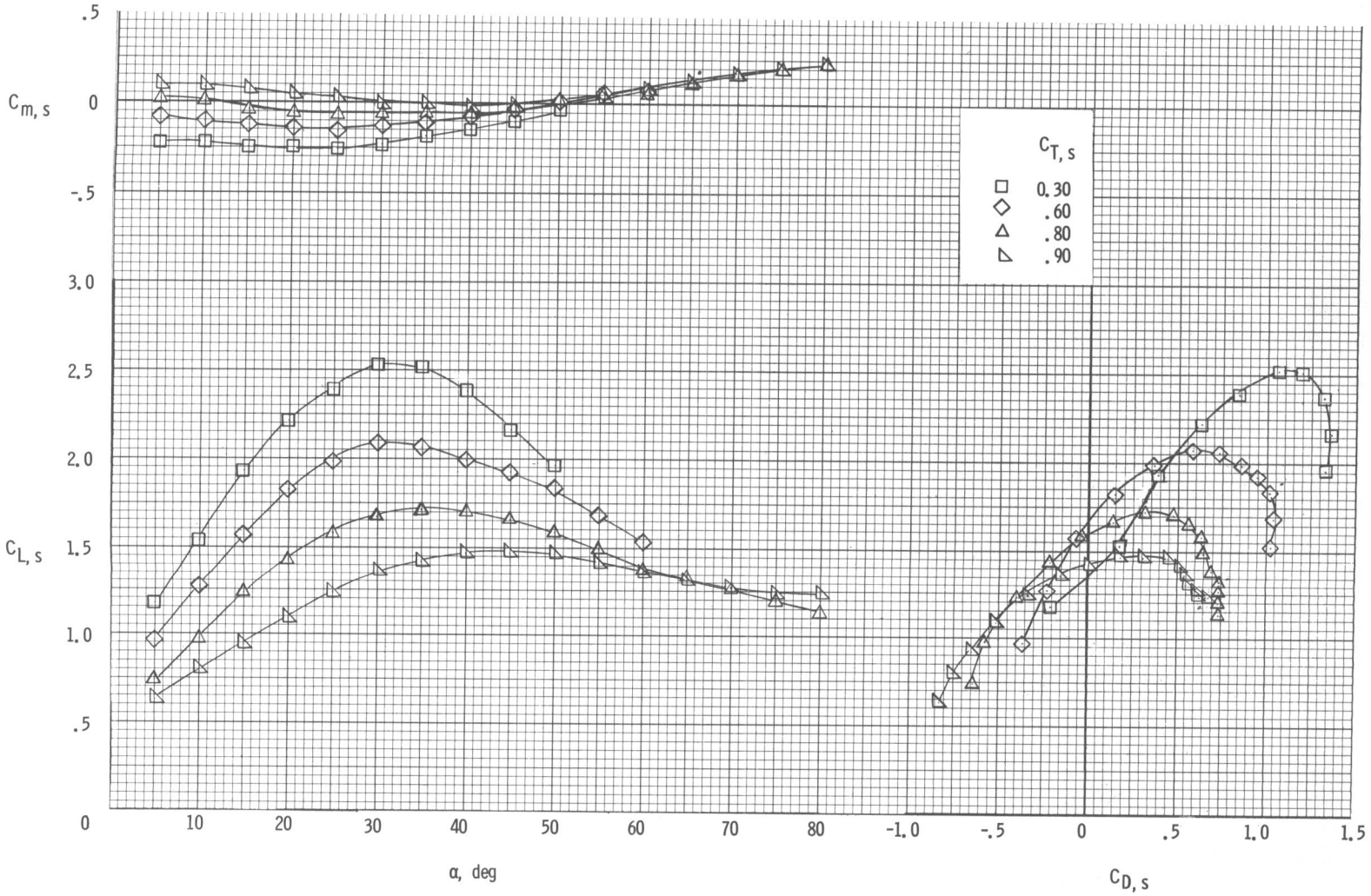
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 20.- Continued.



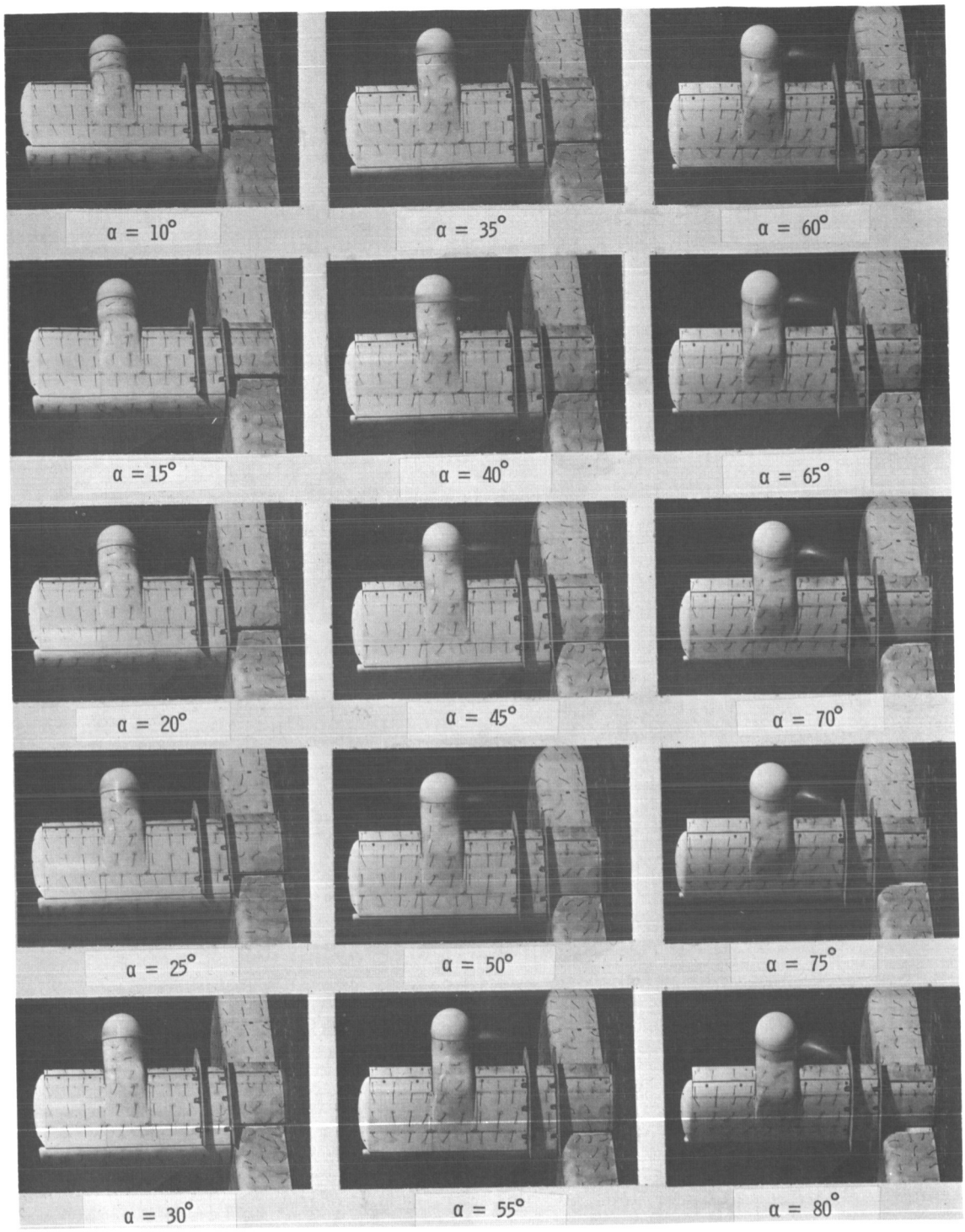
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 20.- Concluded.



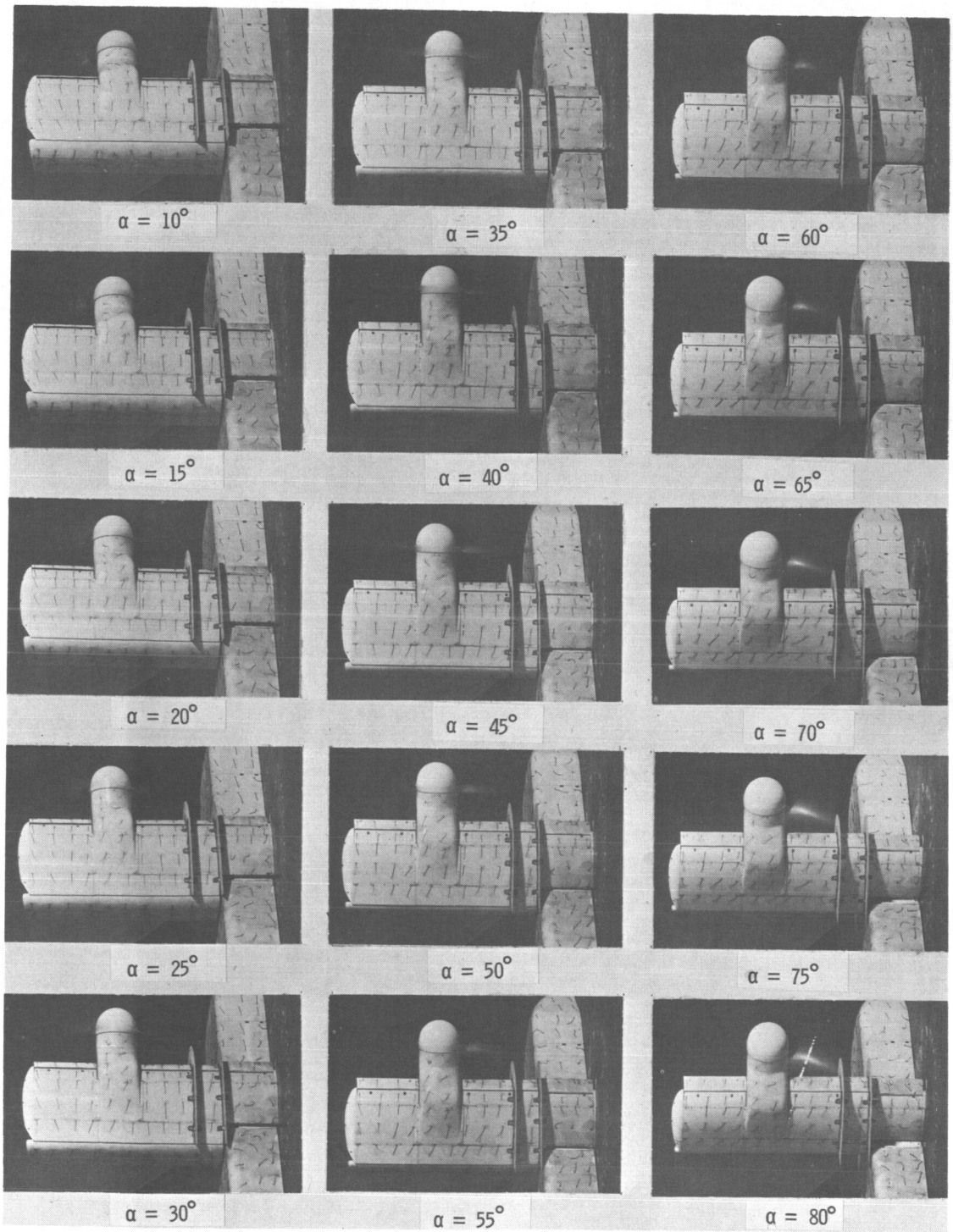
(a) Aerodynamic characteristics.

Figure 21.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, full-span slat on, fences on, and $\delta_f = 60^o$.



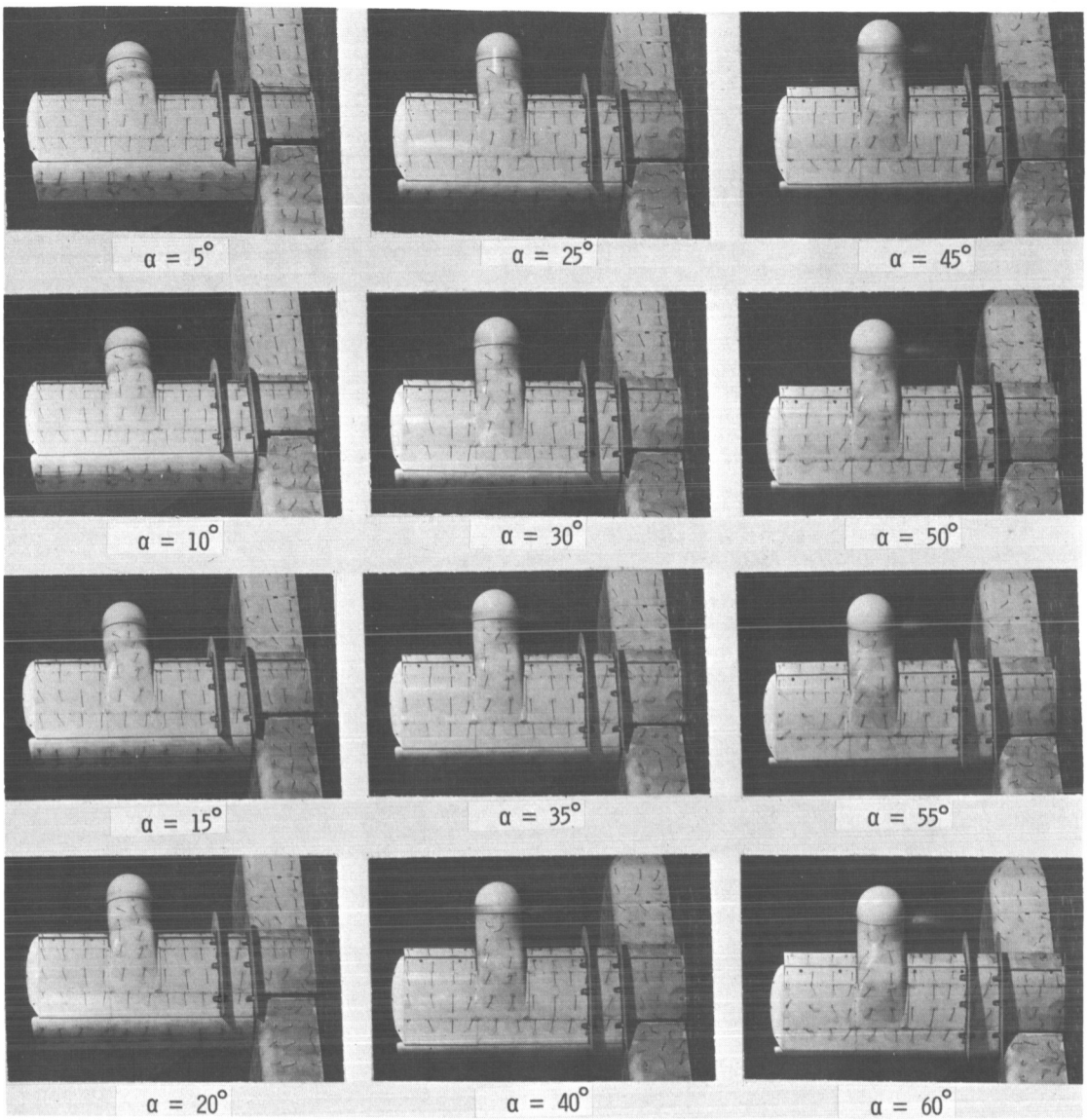
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 21.- Continued.



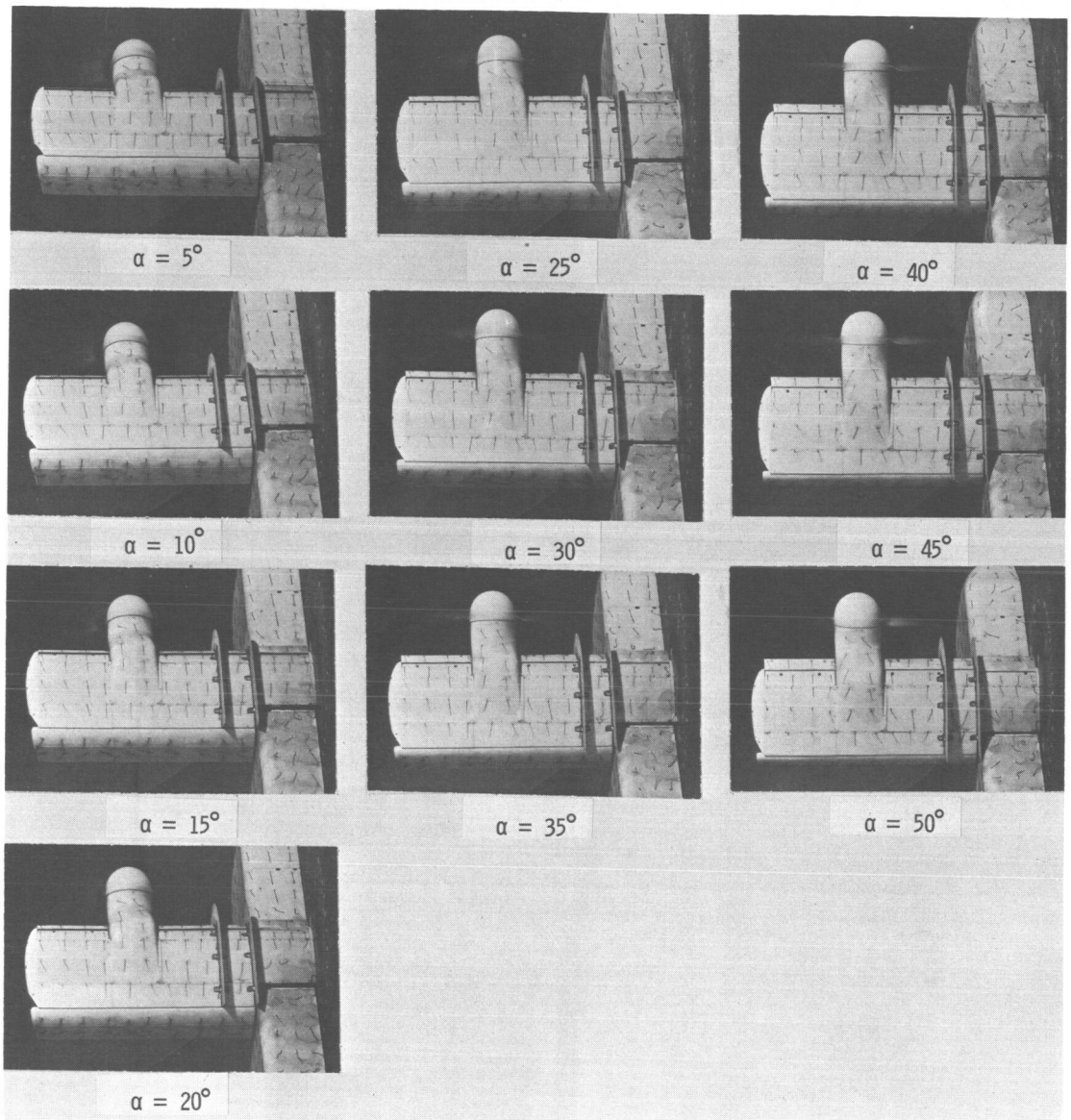
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 21.- Continued.



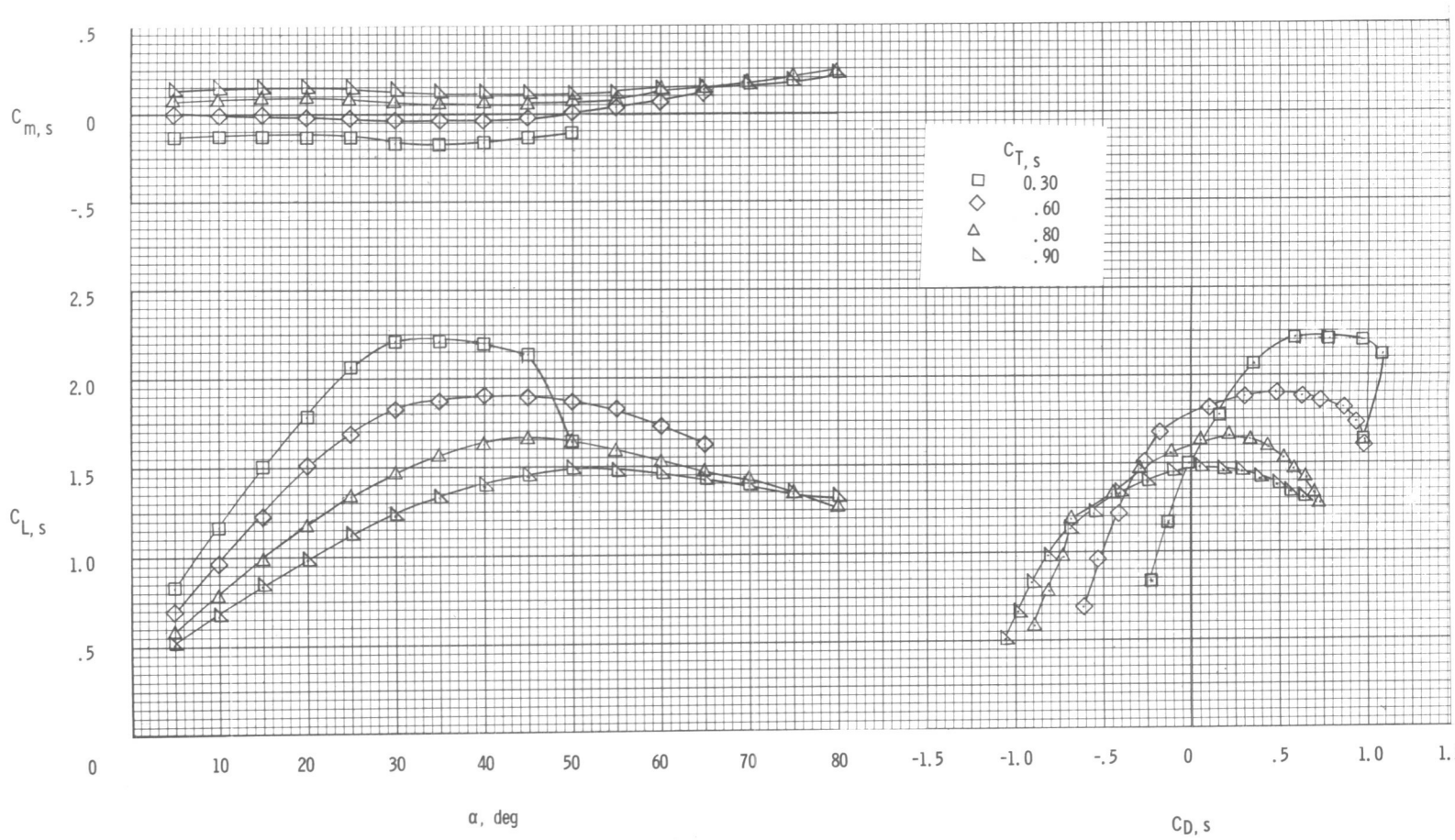
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 21.- Continued.



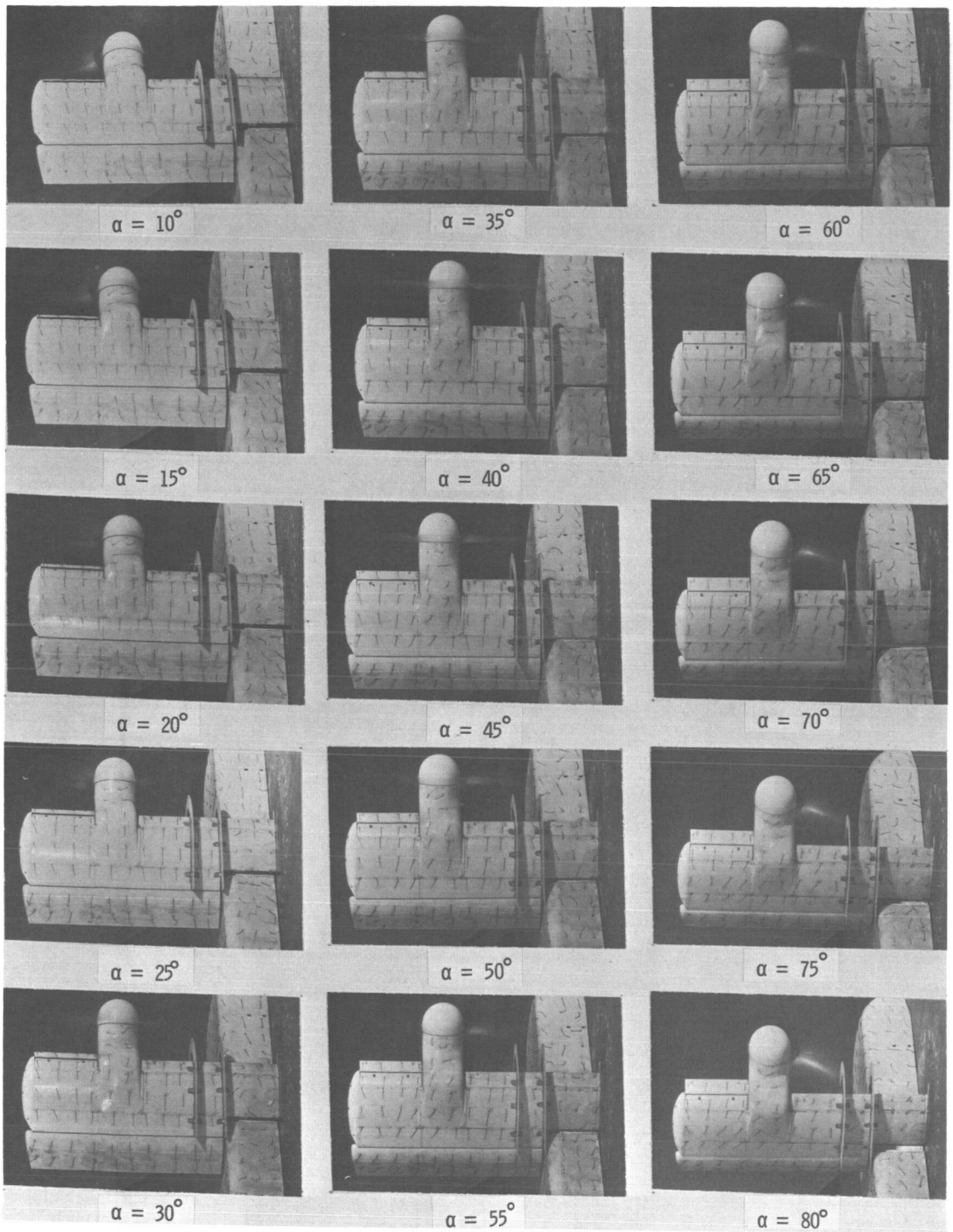
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 21.- Concluded.



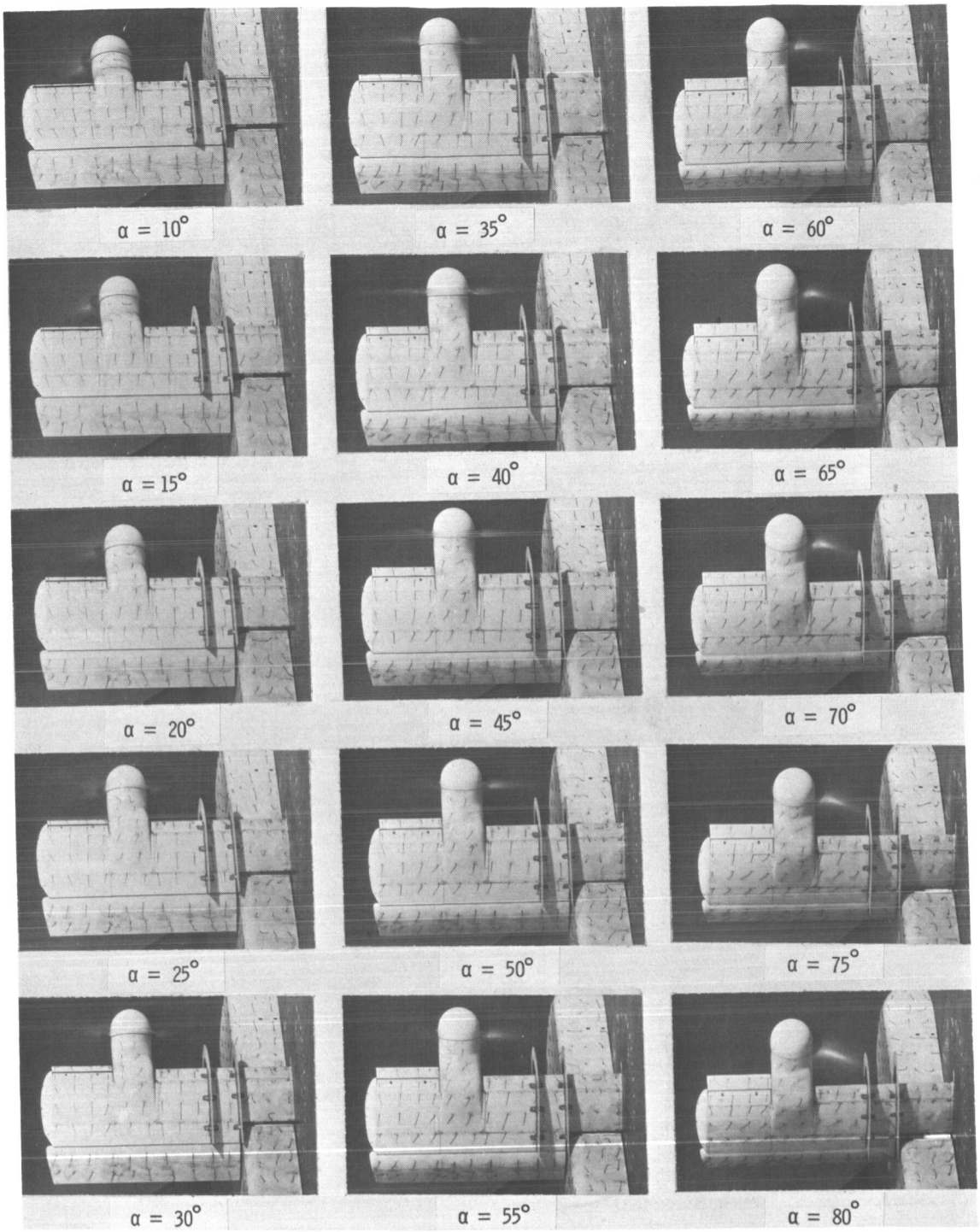
(a) Aerodynamic characteristics.

Figure 22.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, outboard slat on, fences on, and $\delta_f = 20^o$.



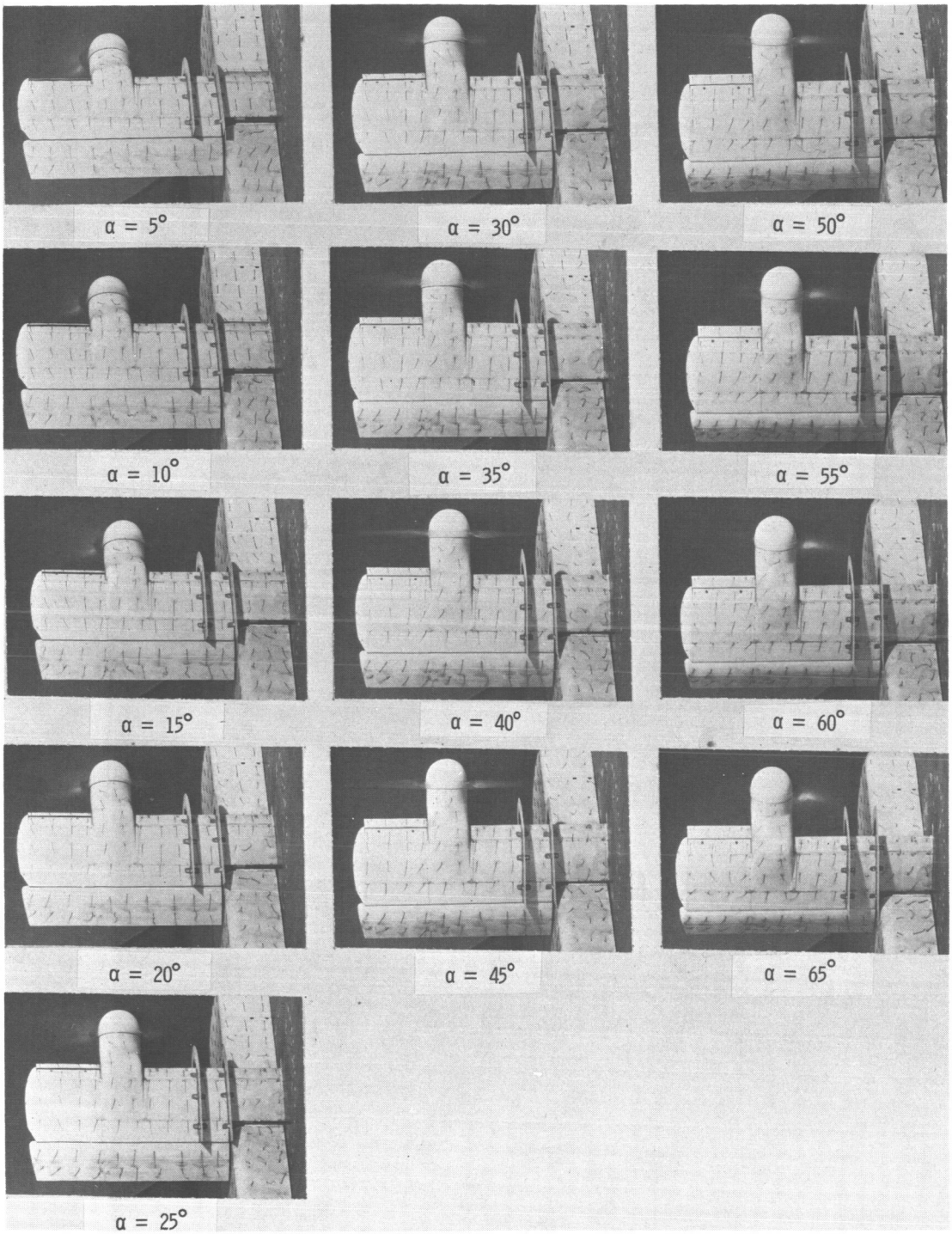
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 22.- Continued.



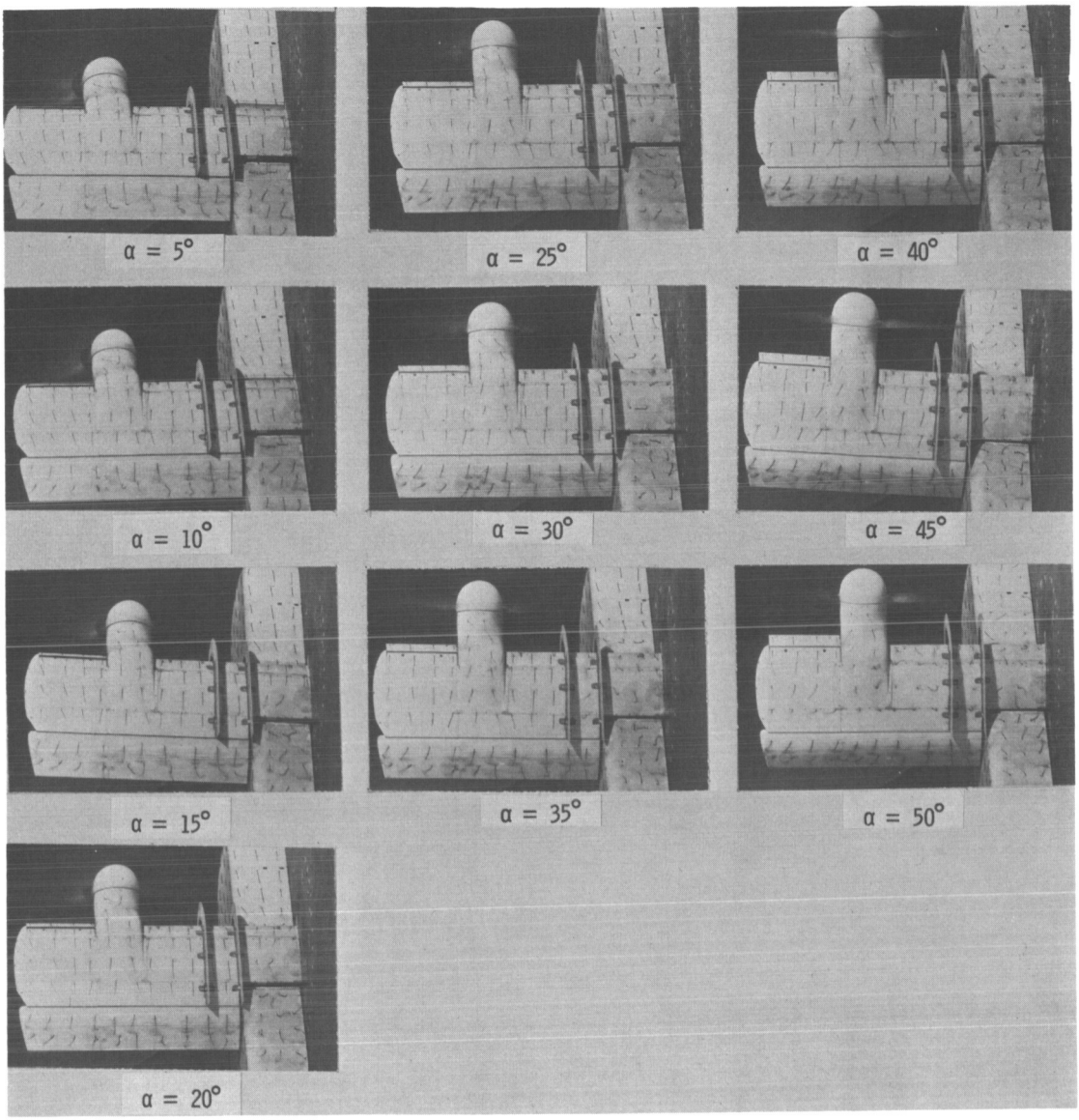
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 22.- Continued.



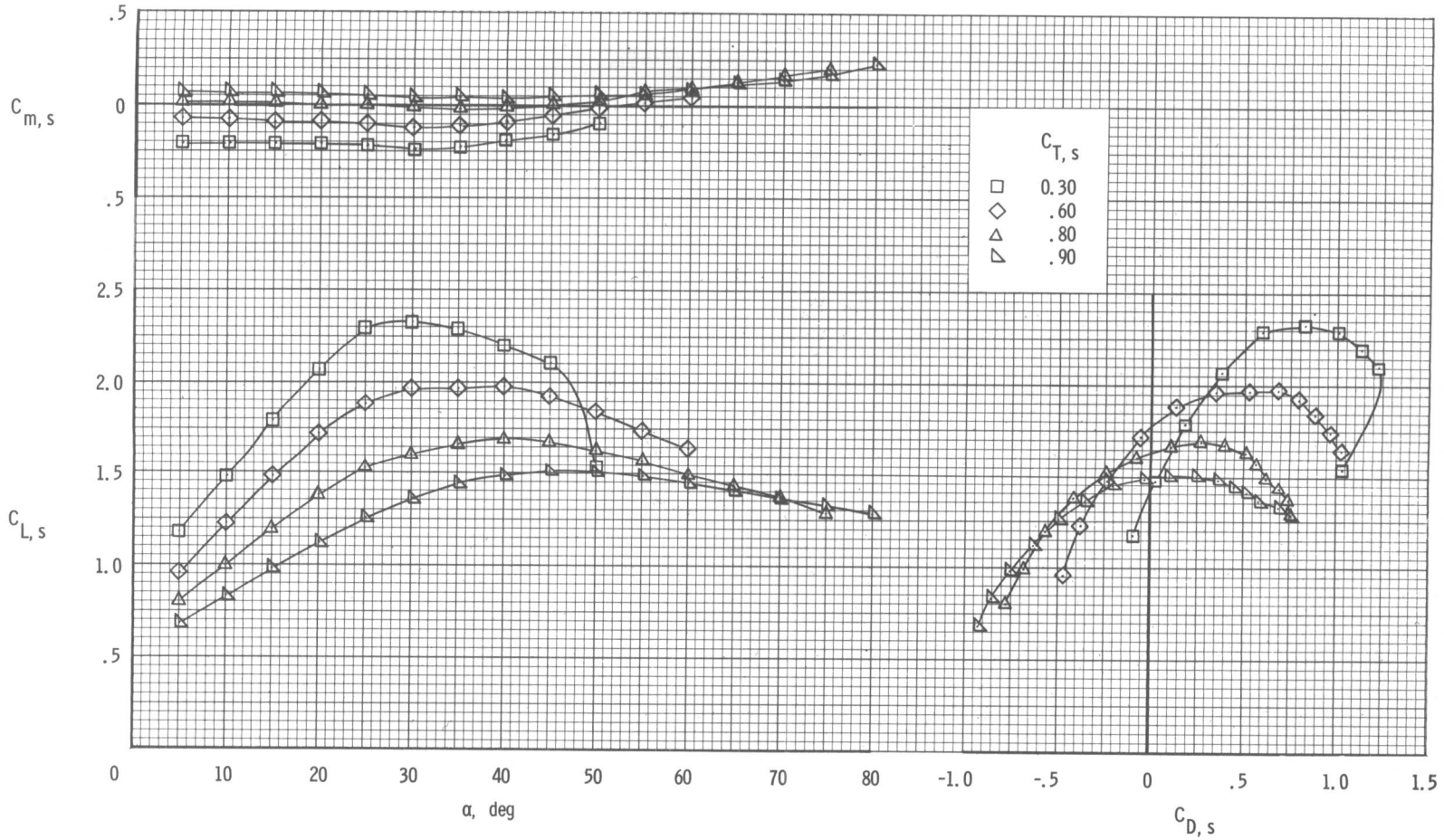
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 22.- Continued.



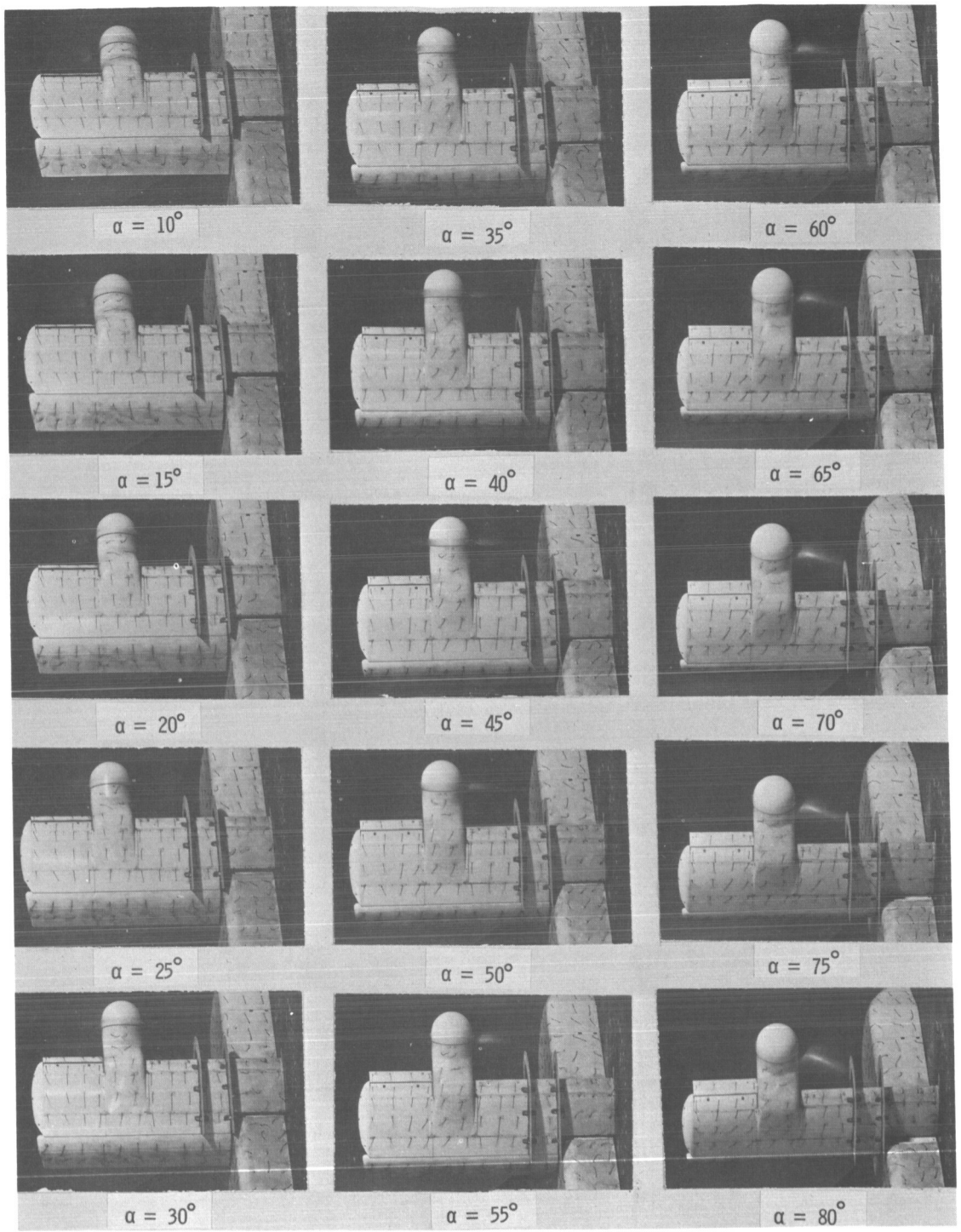
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 22.- Concluded.



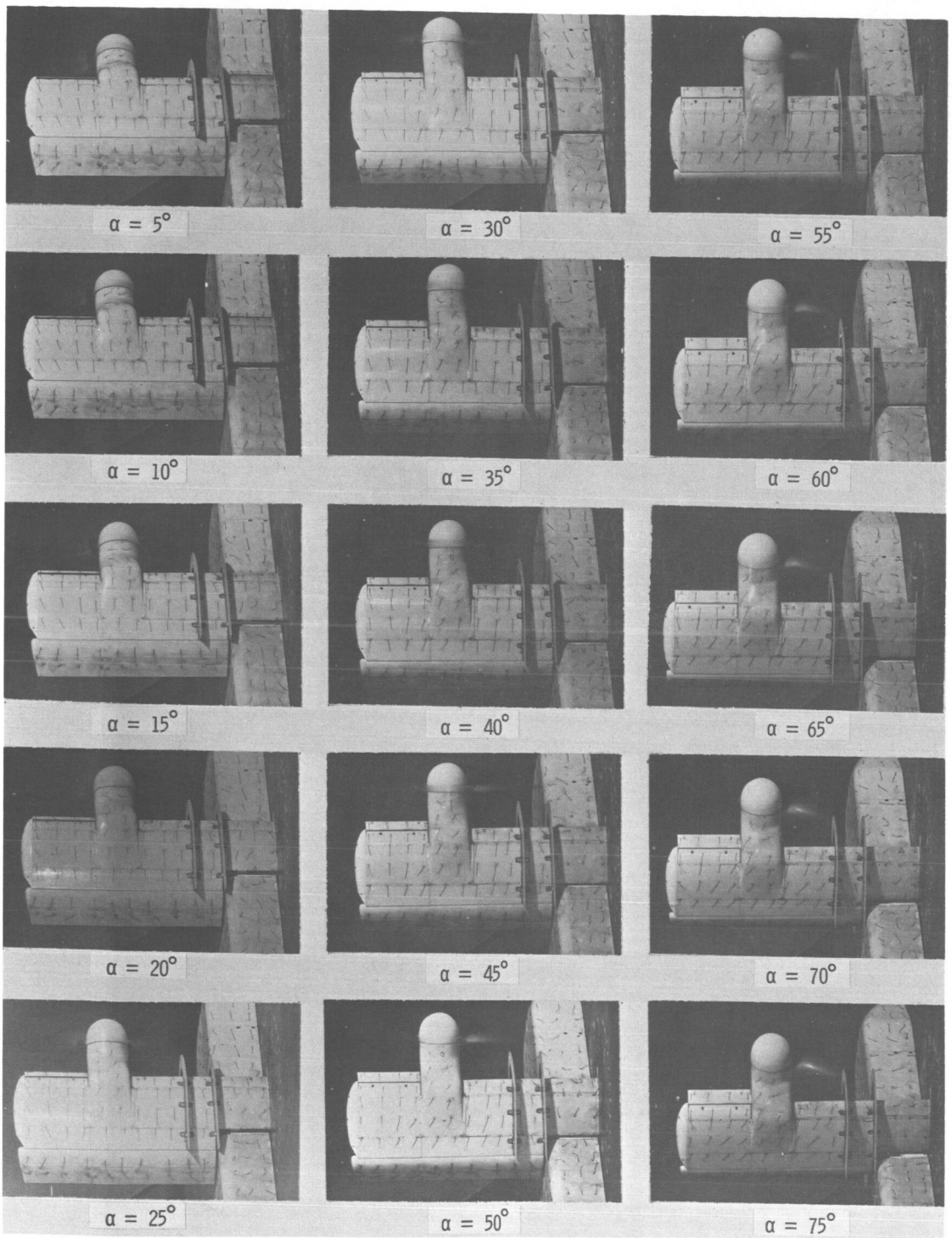
(a) Aerodynamic characteristics.

Figure 23.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, outboard slat on, fences on, and $\delta_f = 40^o$.



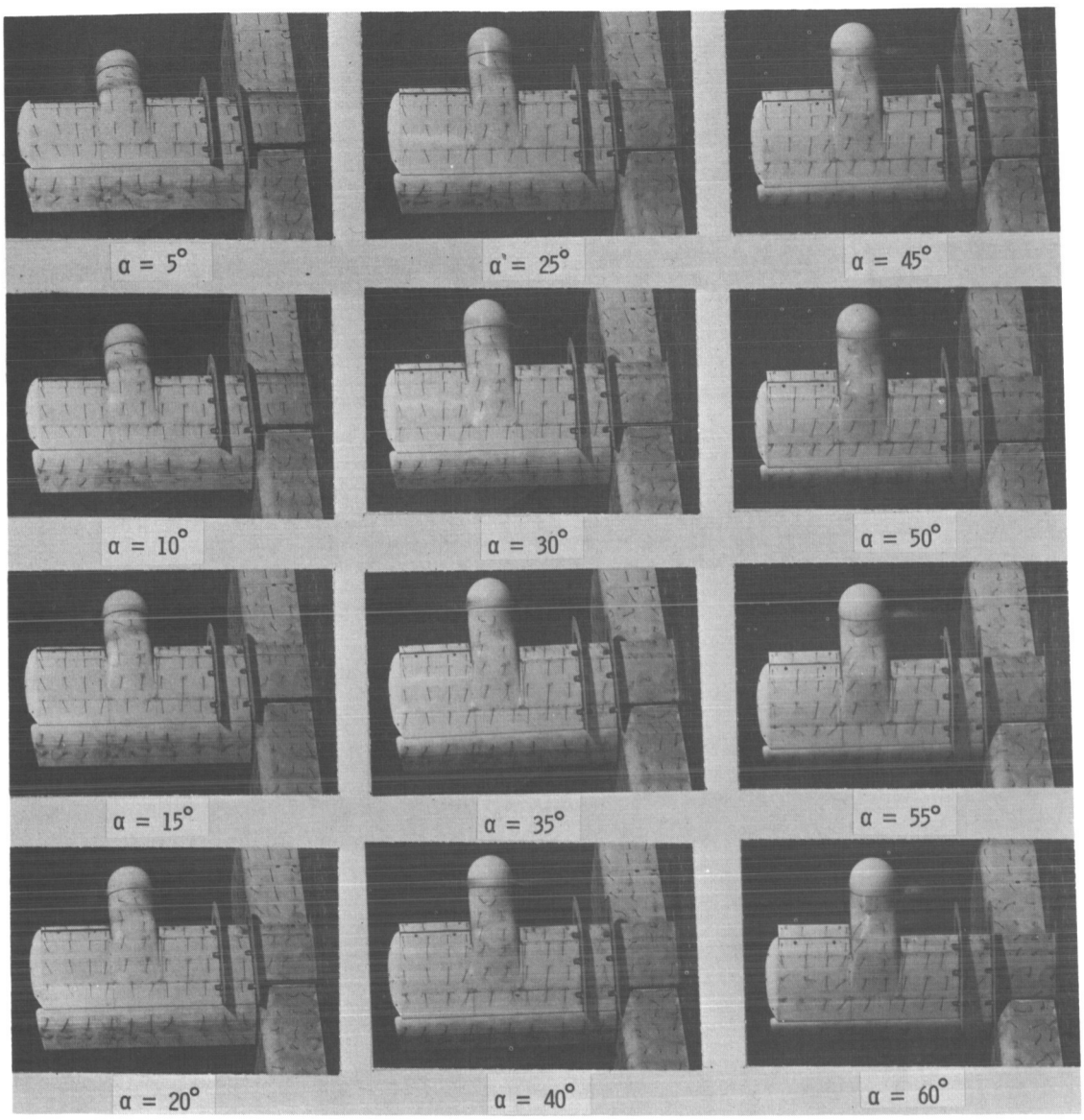
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 23.- Continued.



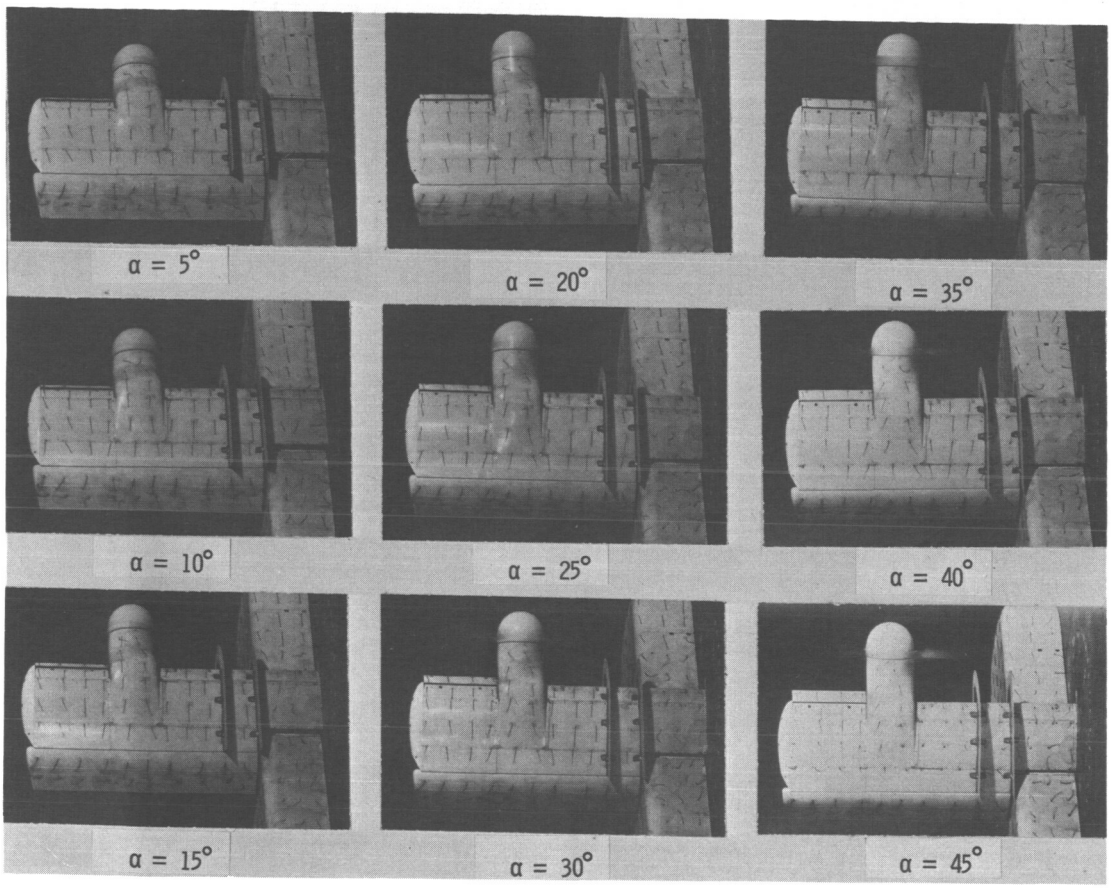
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 23.- Continued.



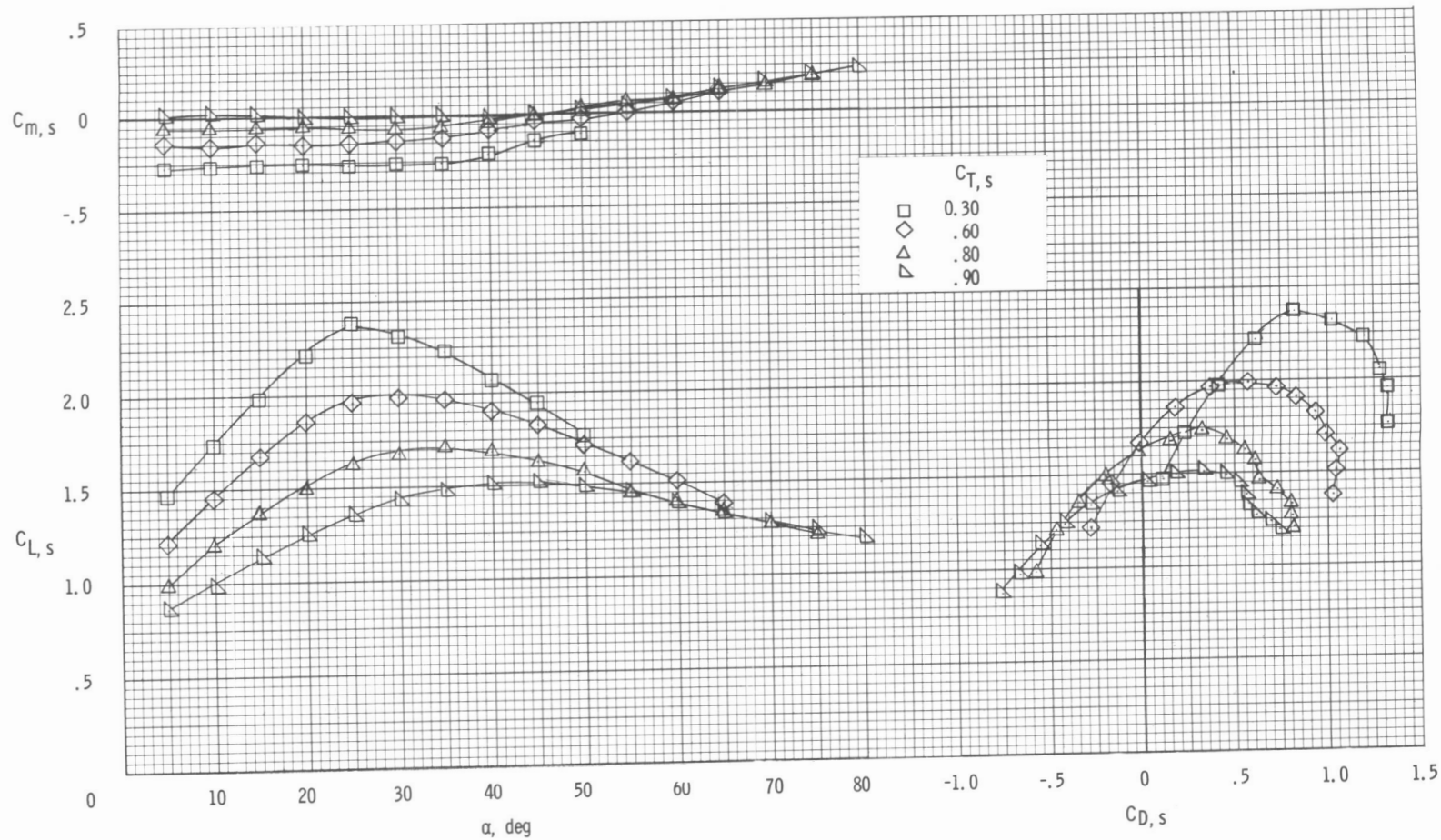
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 23.- Continued.



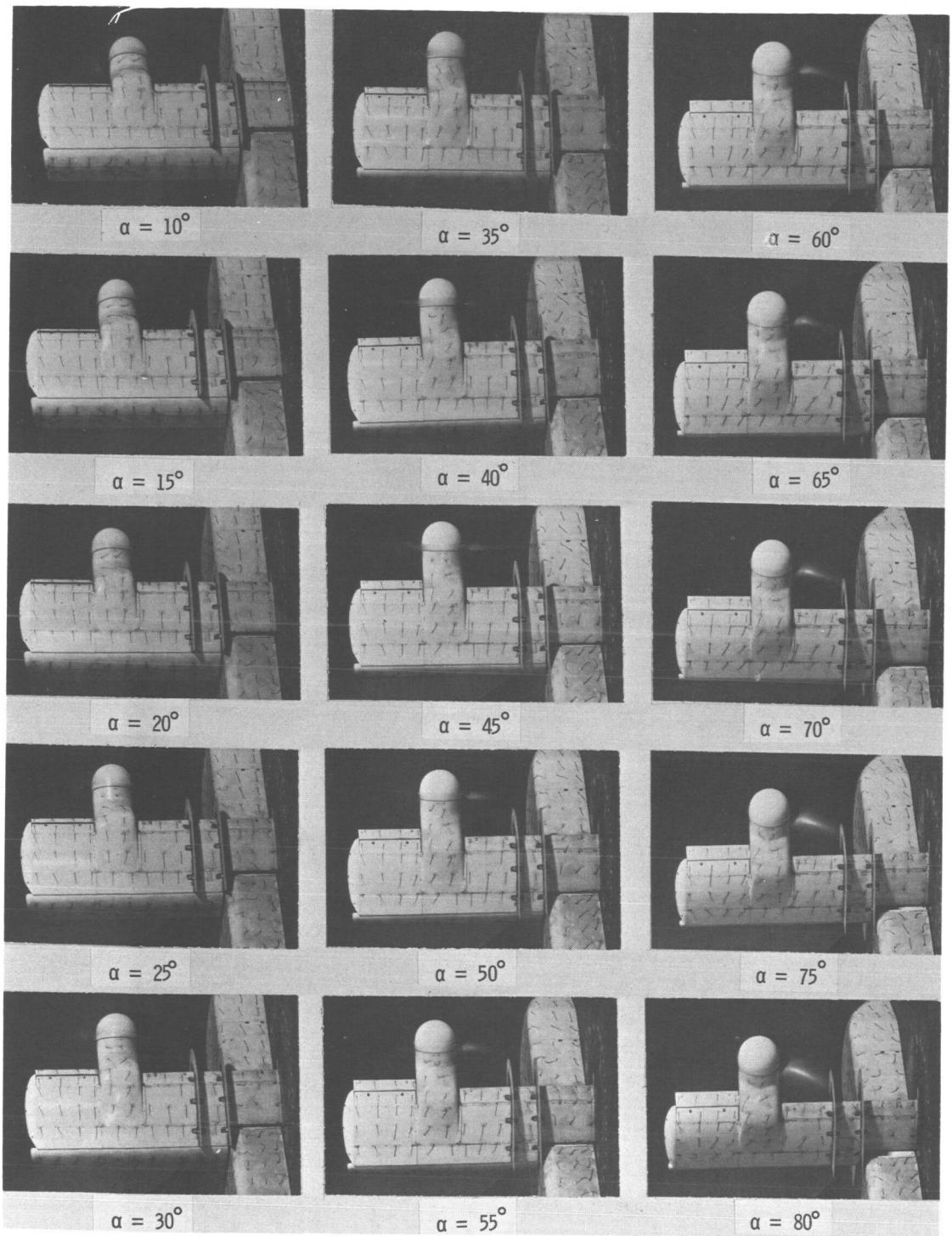
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 23.- Concluded.



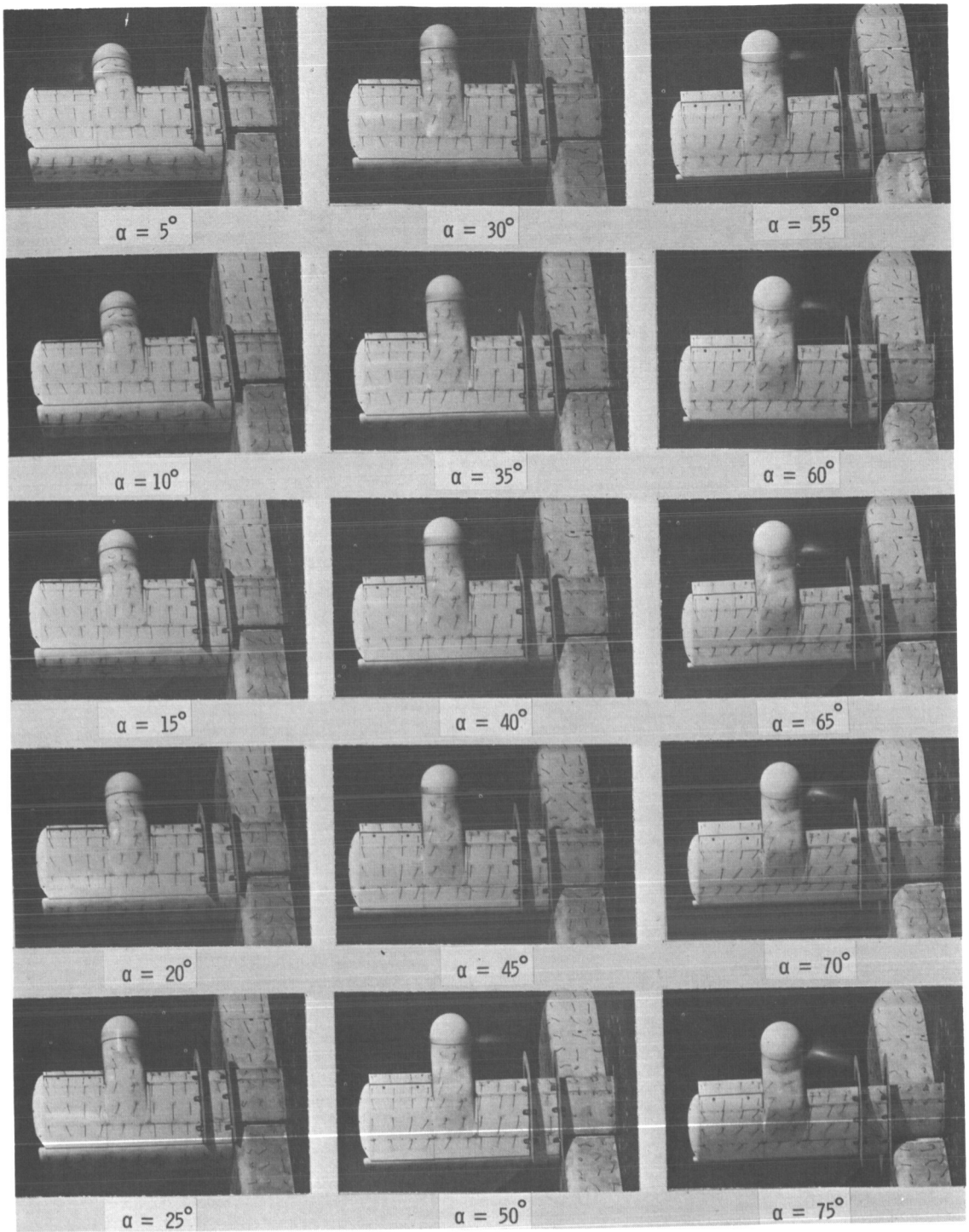
(a) Aerodynamic characteristics.

Figure 24.- Aerodynamic and flow characteristics of the wing with the propeller rotating up at the tip, outboard slat on, fences on, and $\delta_f = 60^0$.



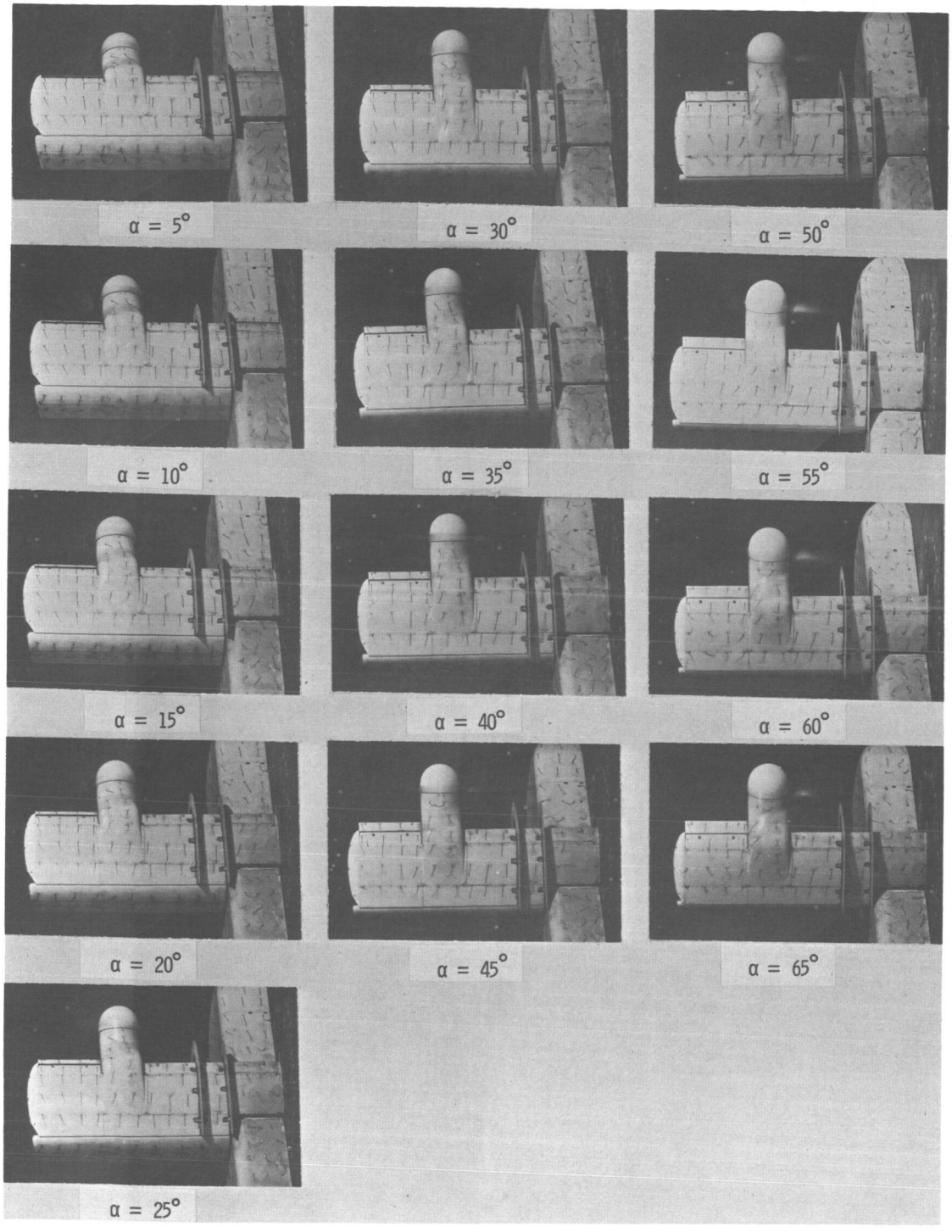
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 24.- Continued.



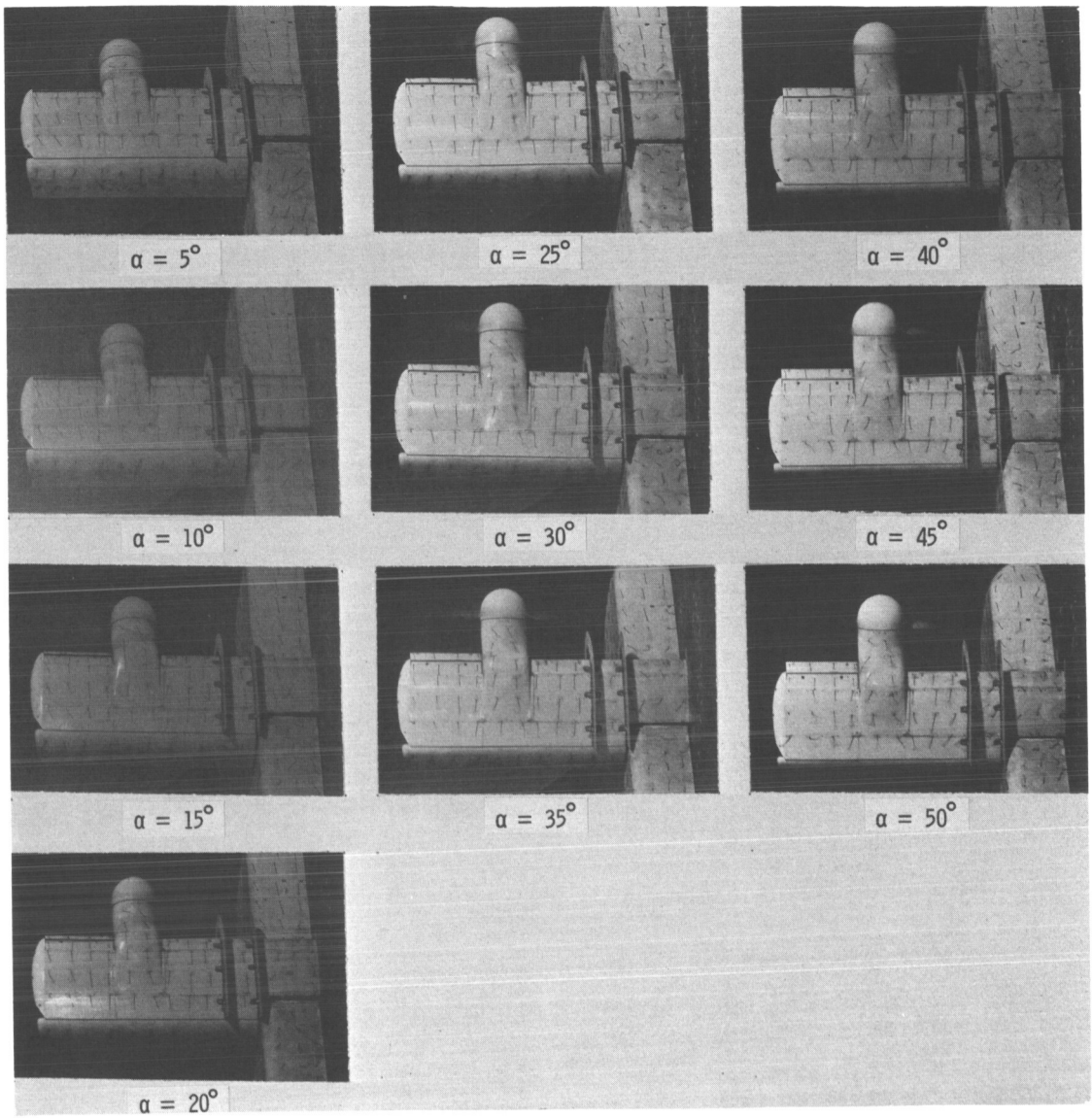
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 24.- Continued.



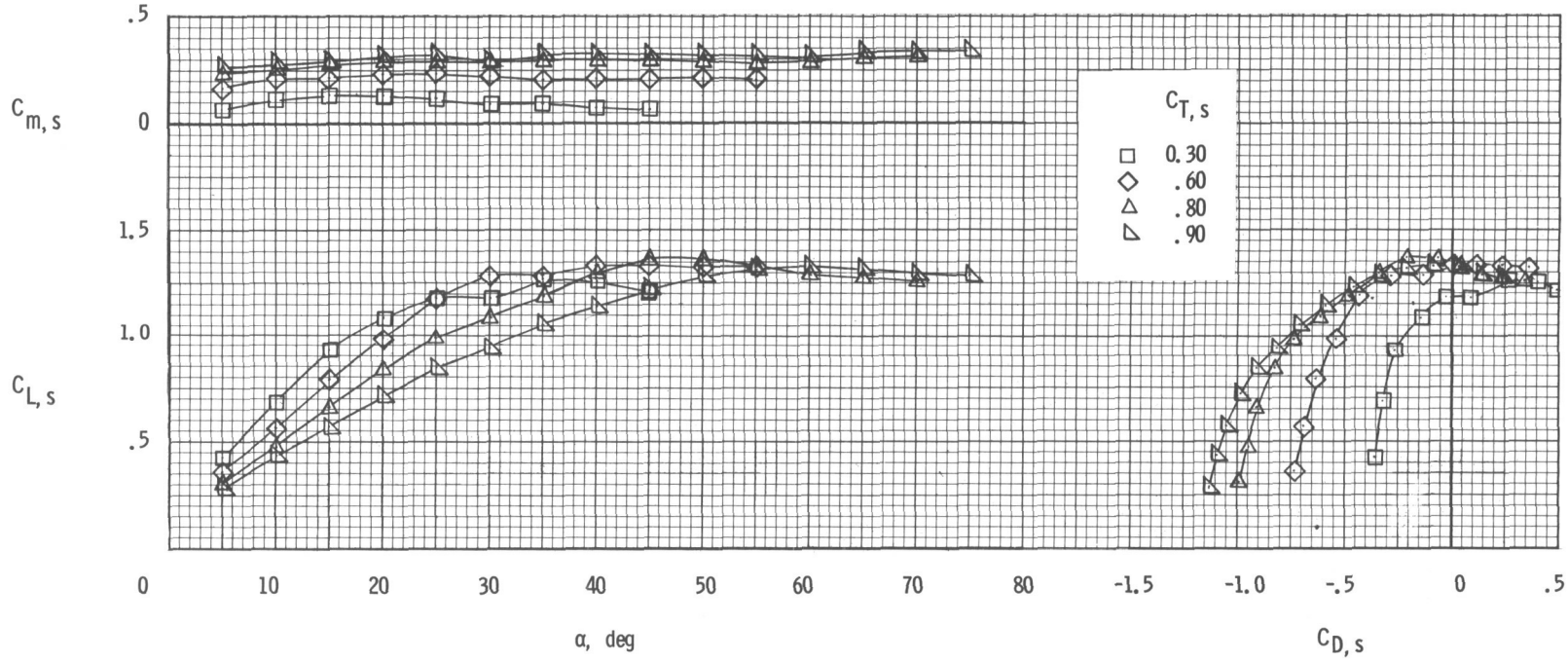
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 24.- Continued.



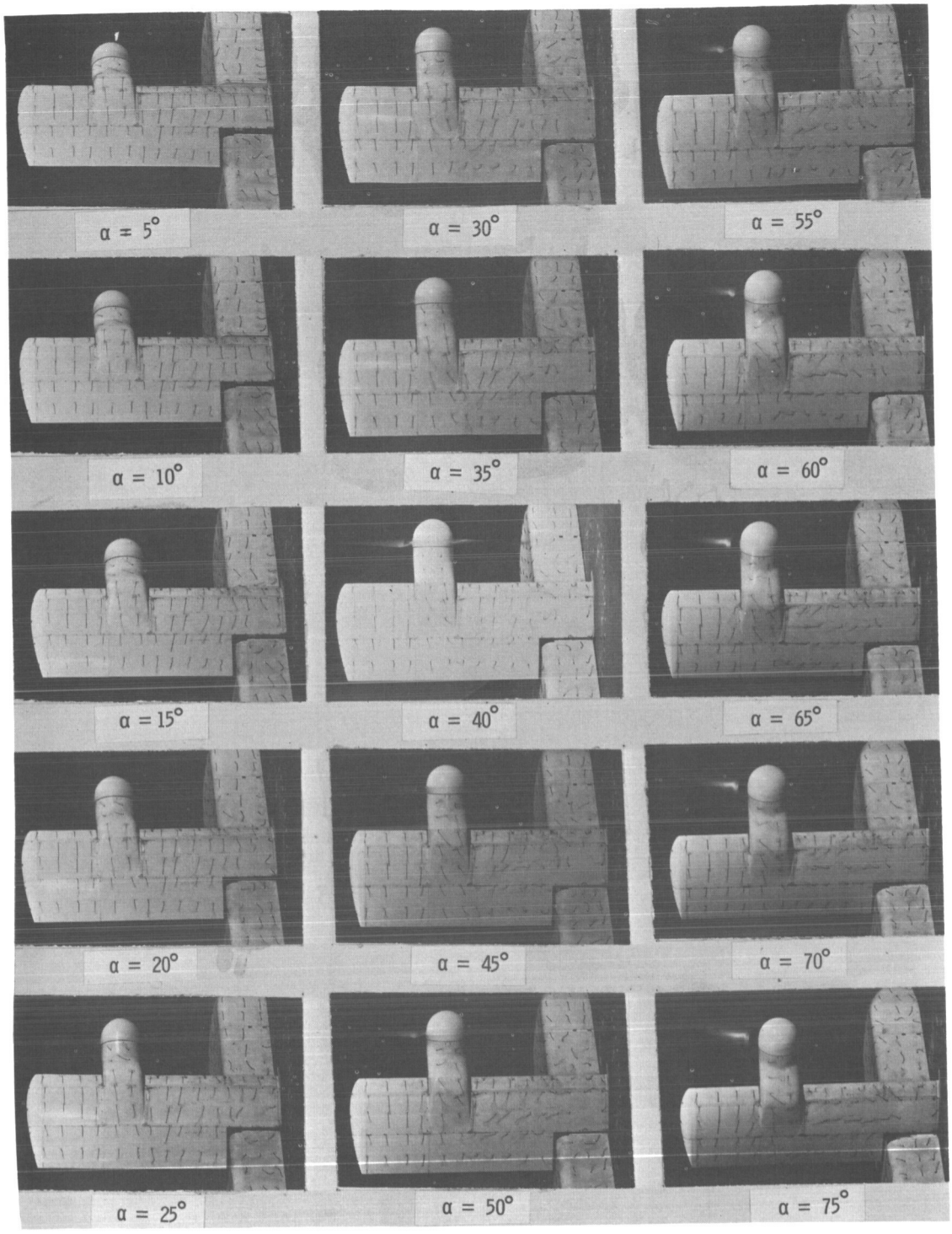
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 24.- Concluded.



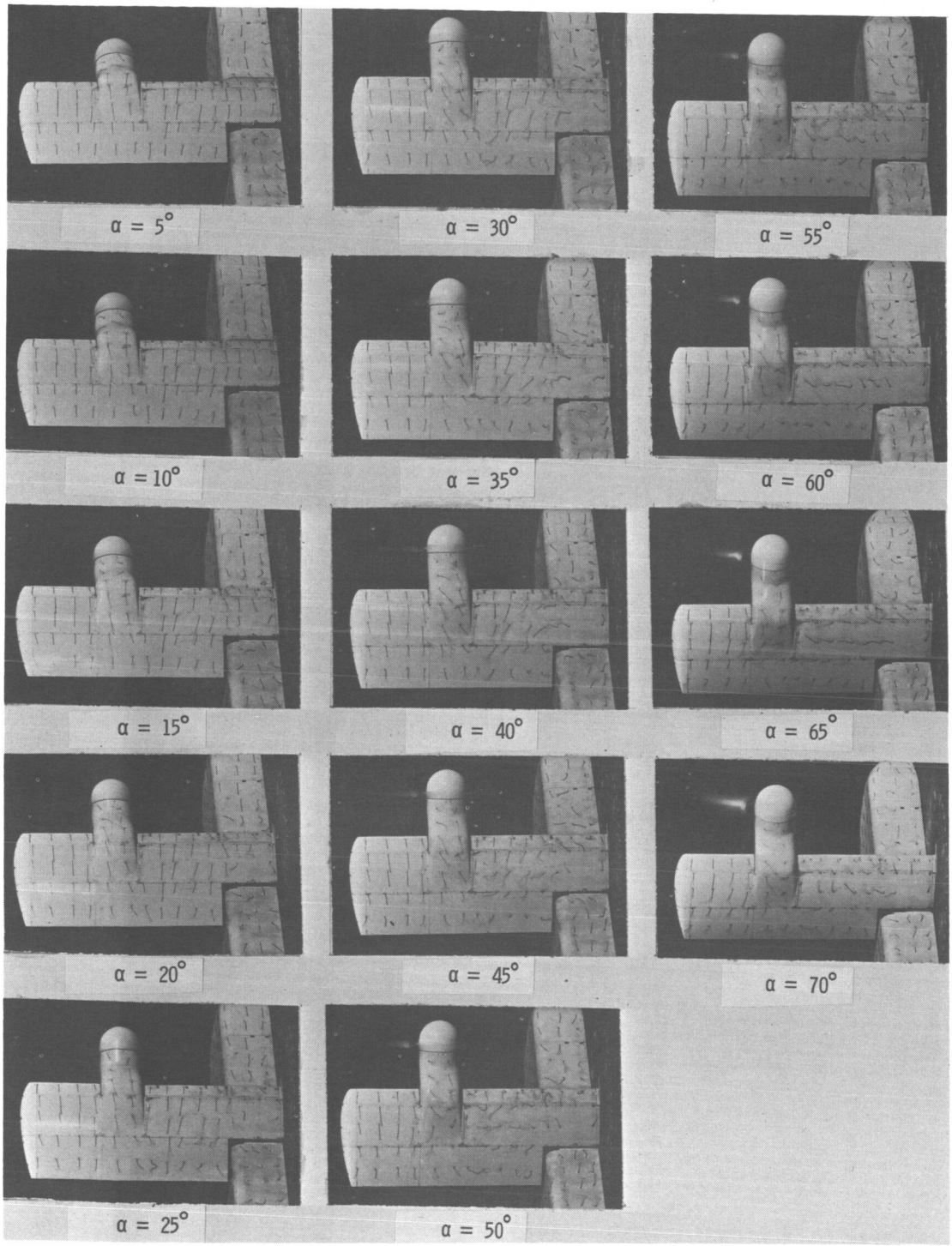
(a) Aerodynamic characteristics.

Figure 25.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, basic leading edge, and $\delta_f = 0^o$.



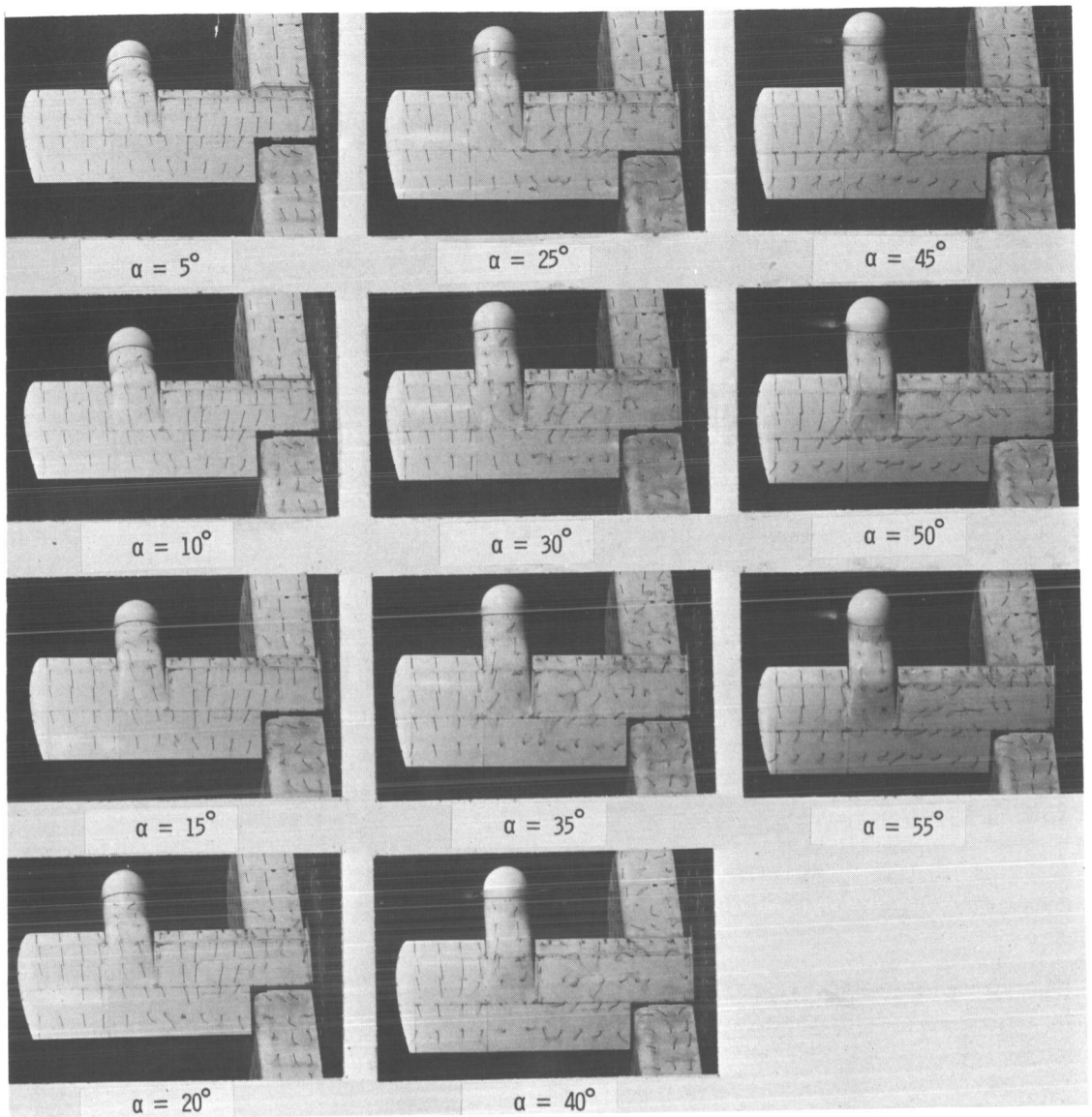
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 25.- Continued.



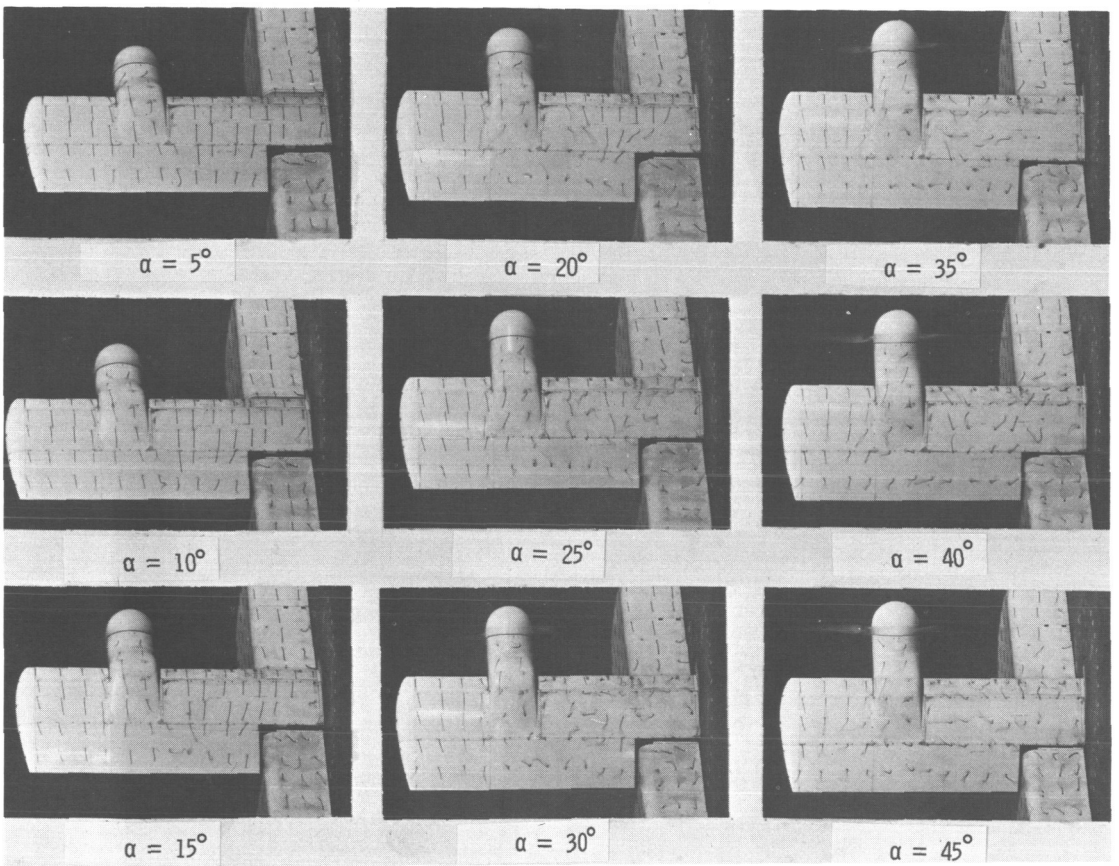
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 25.- Continued.



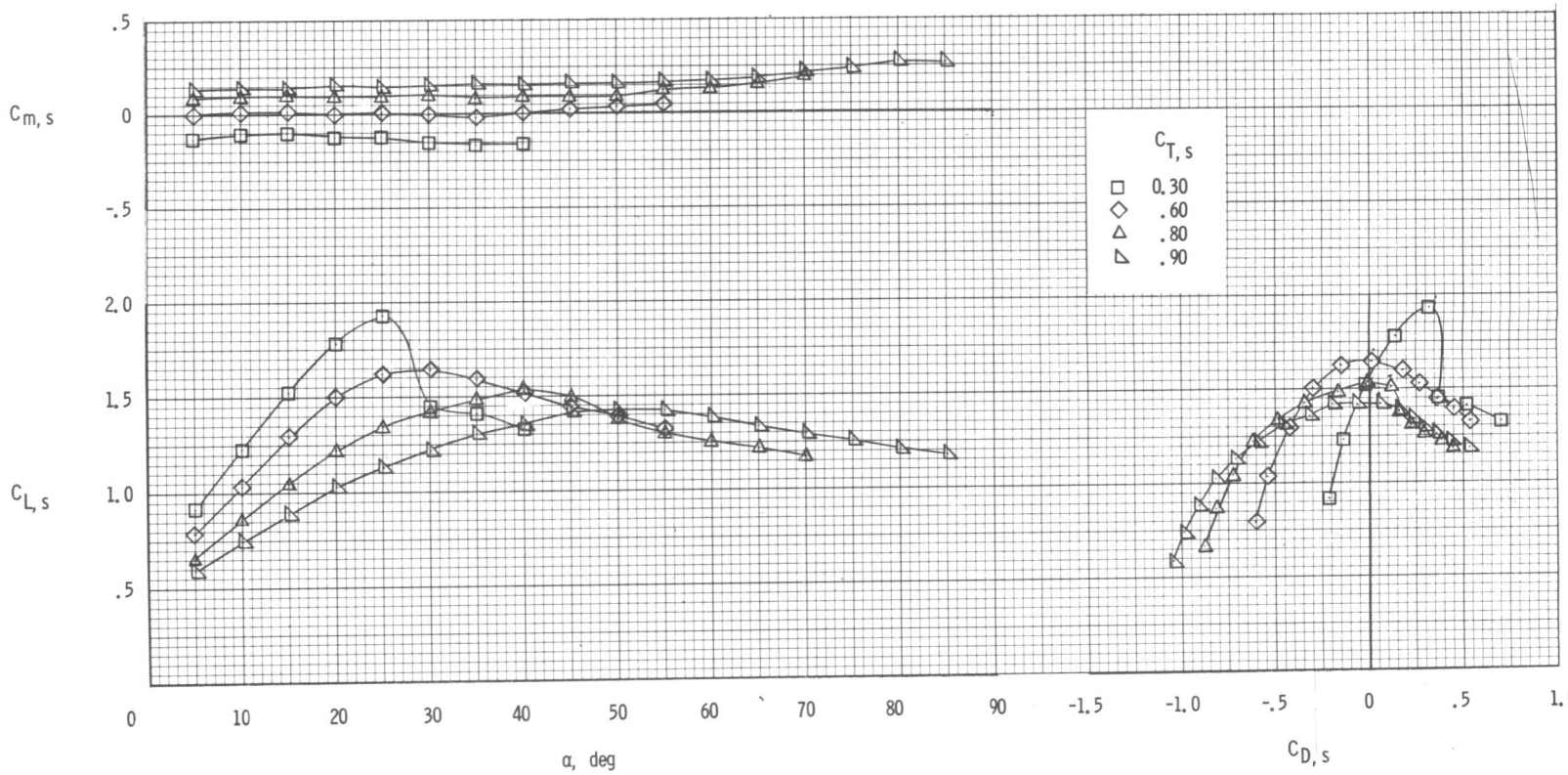
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 25.- Continued.



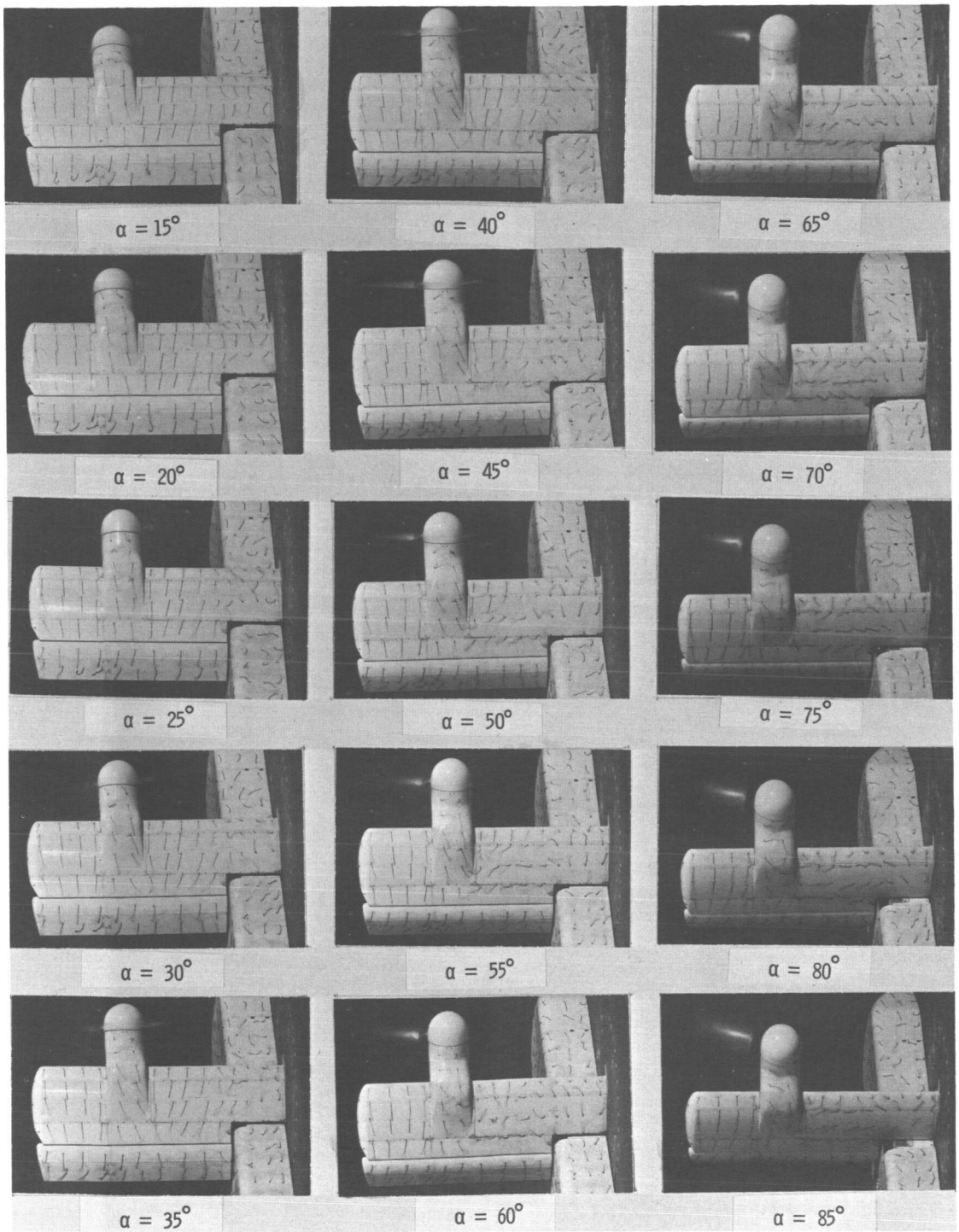
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 25.- Concluded.



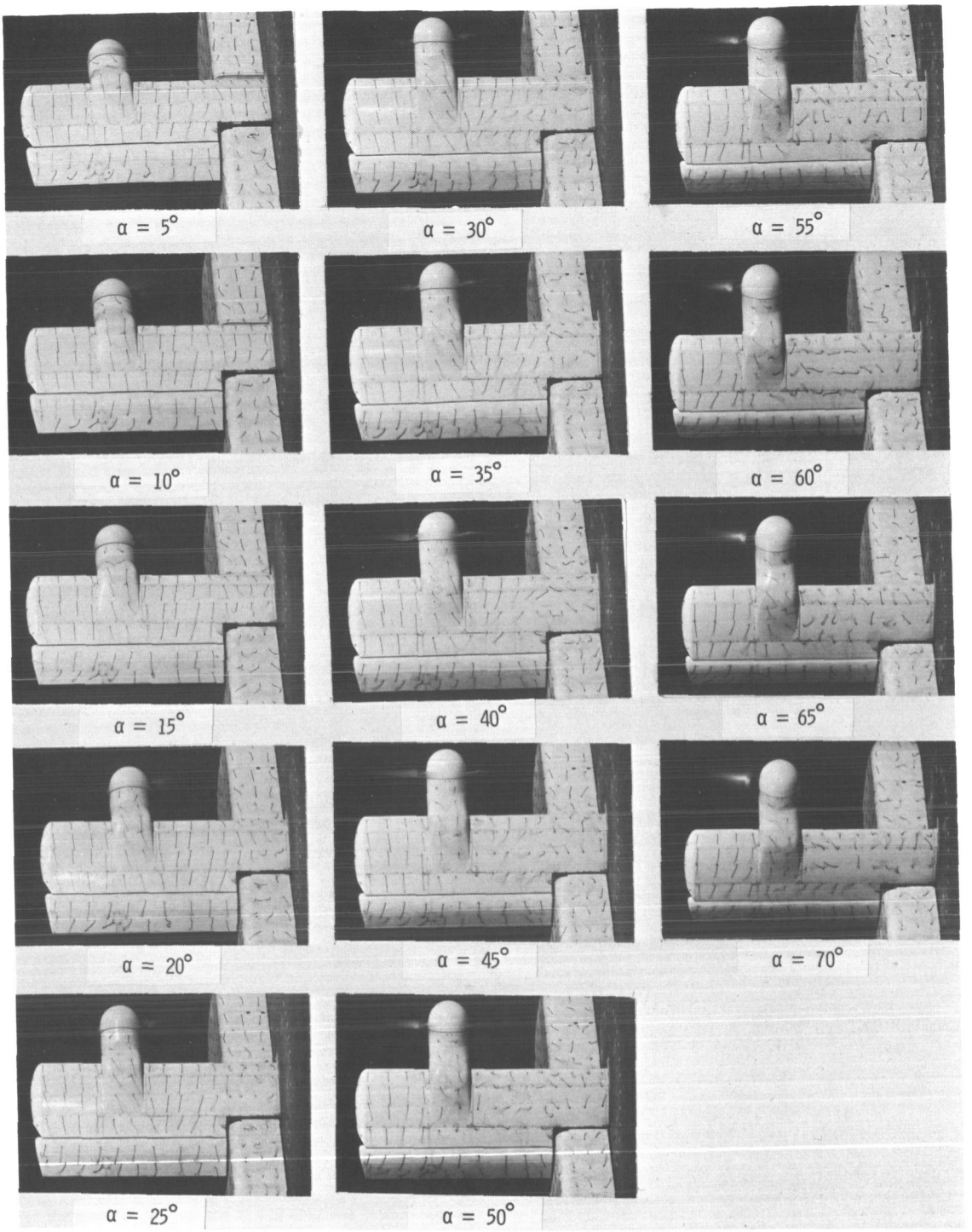
(a) Aerodynamic characteristics.

Figure 26.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, basic leading edge, and $\delta_f = 20^o$.



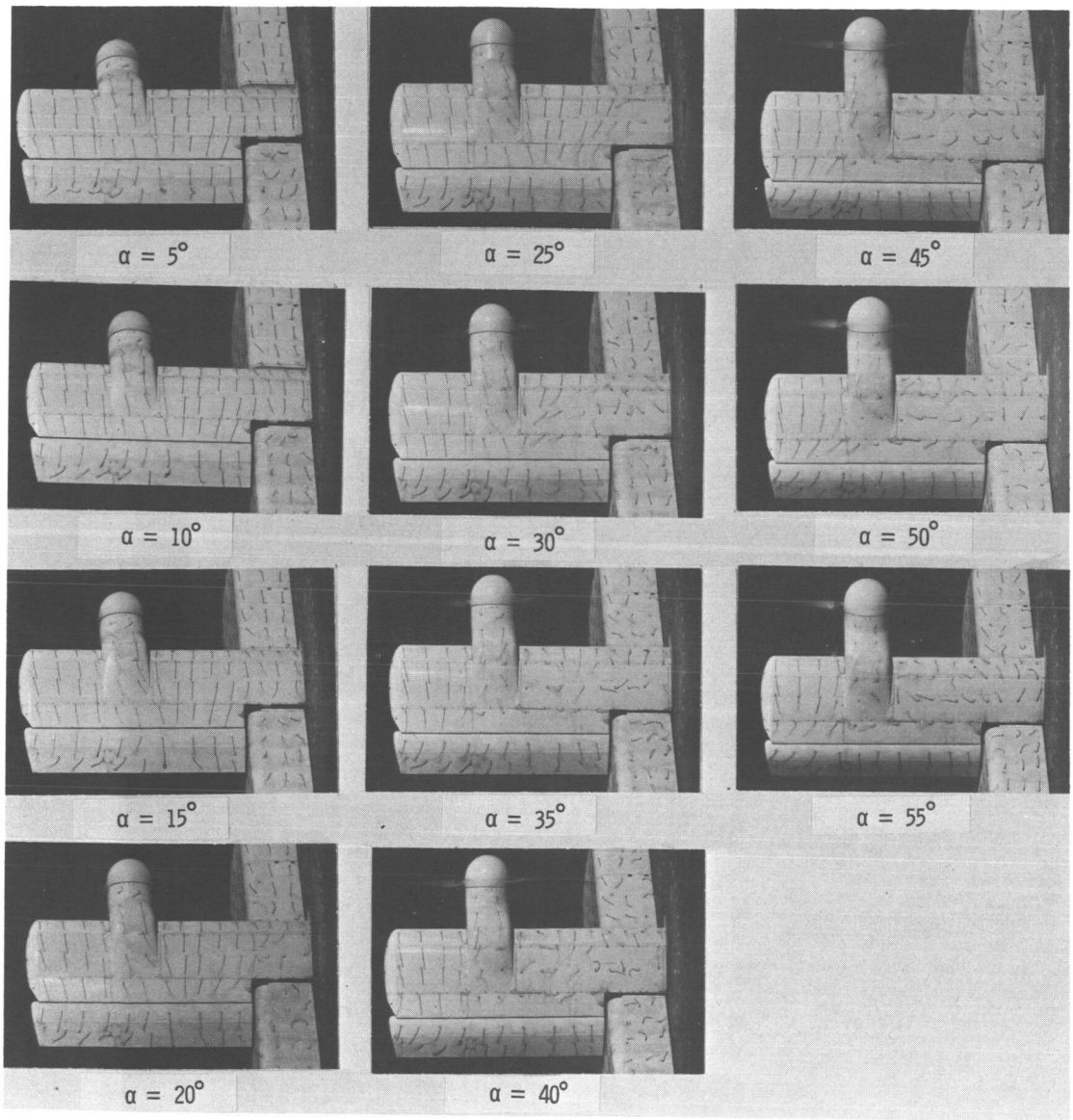
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 26.- Continued.



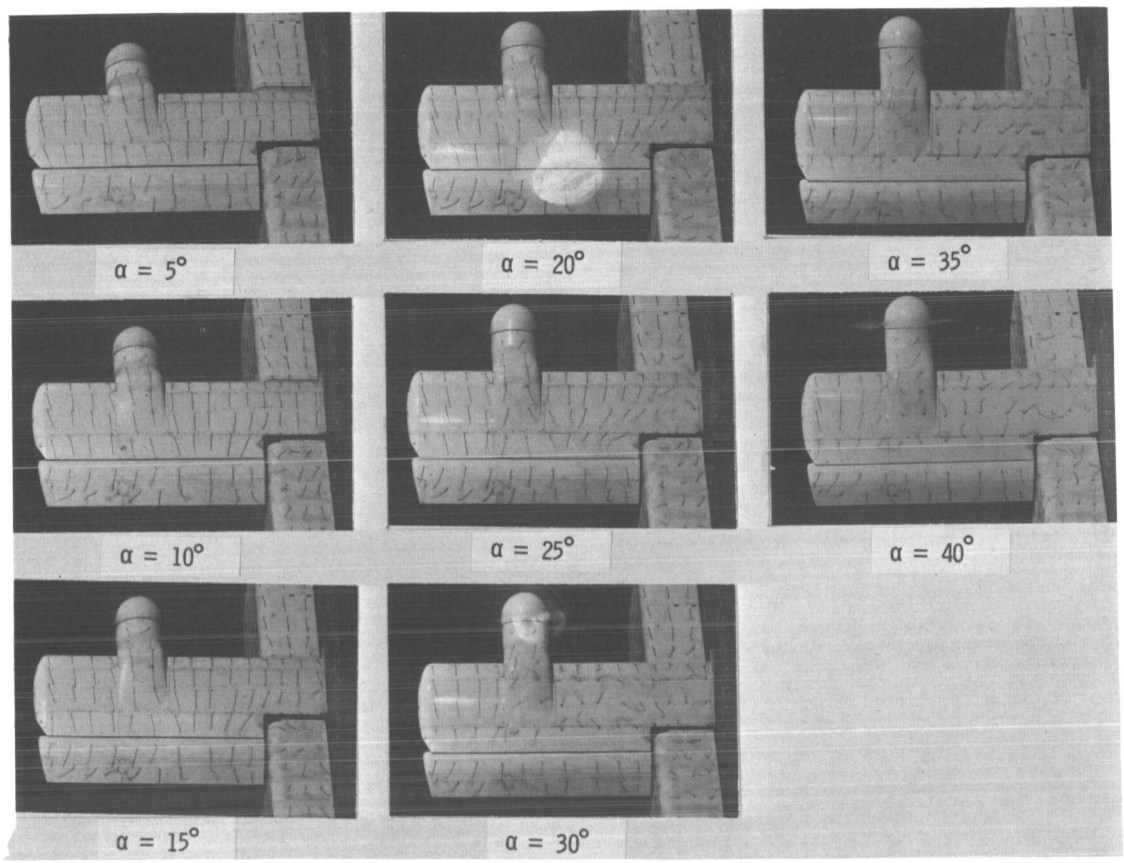
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 26.- Continued.



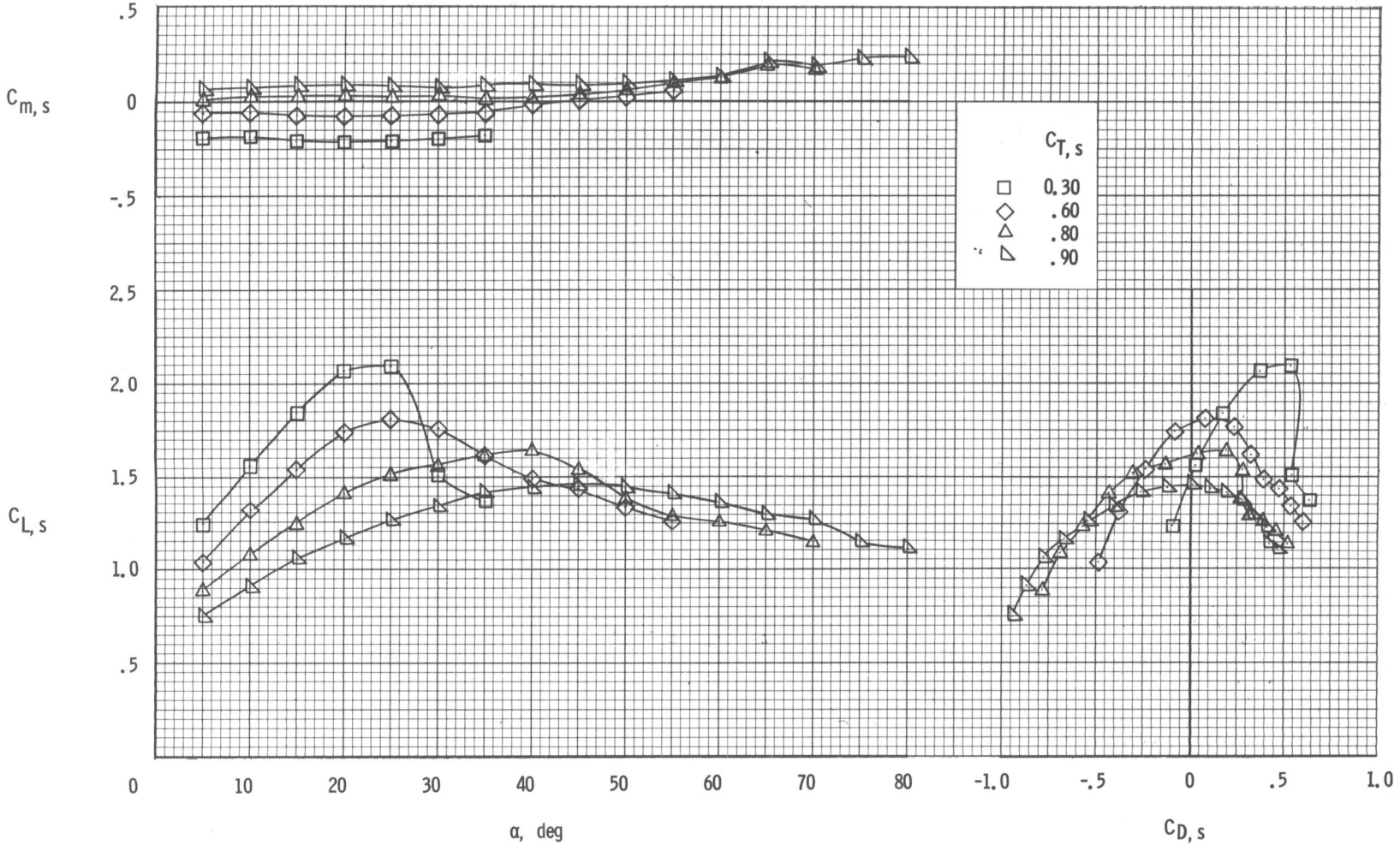
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 26.- Continued.



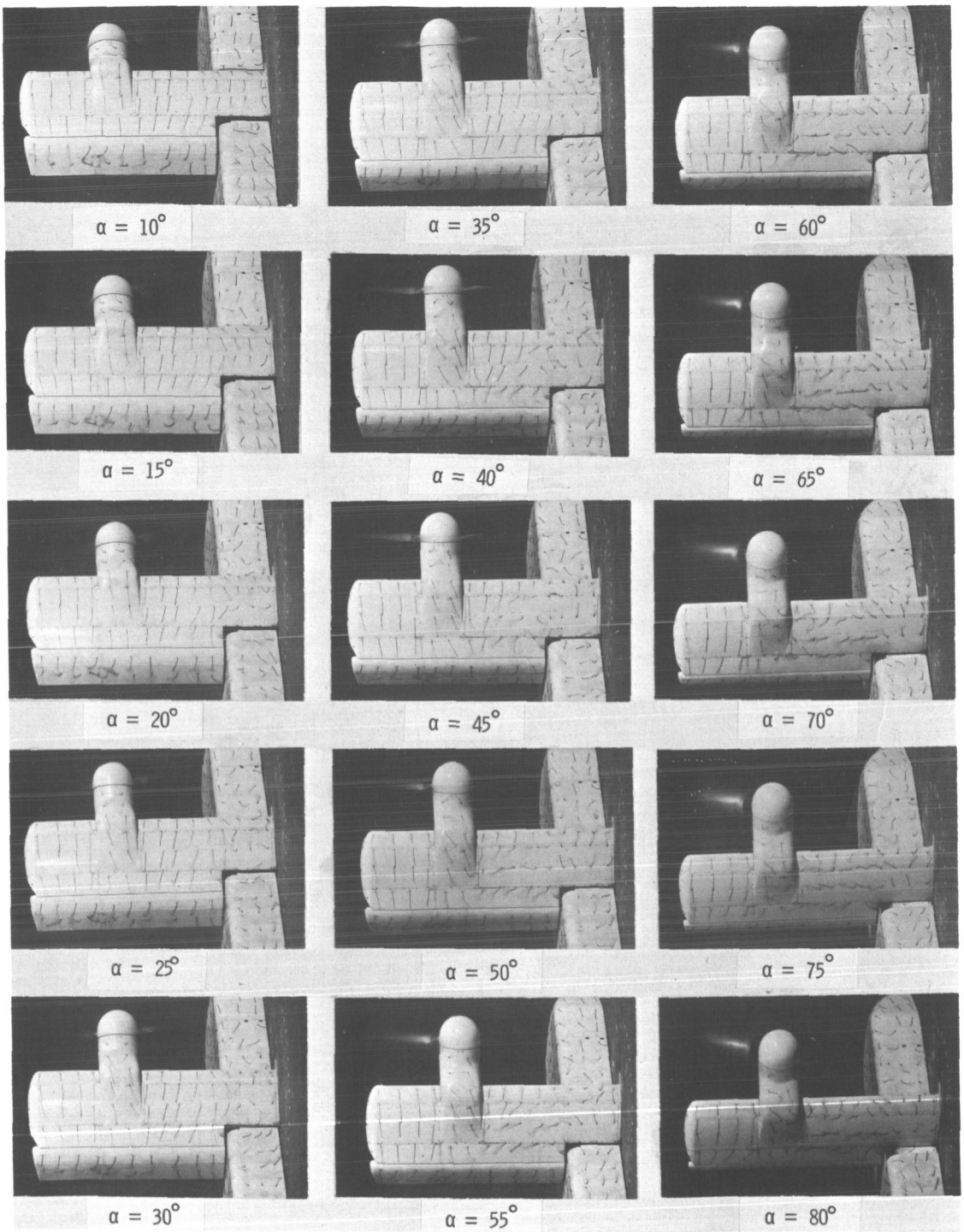
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 26.- Concluded.



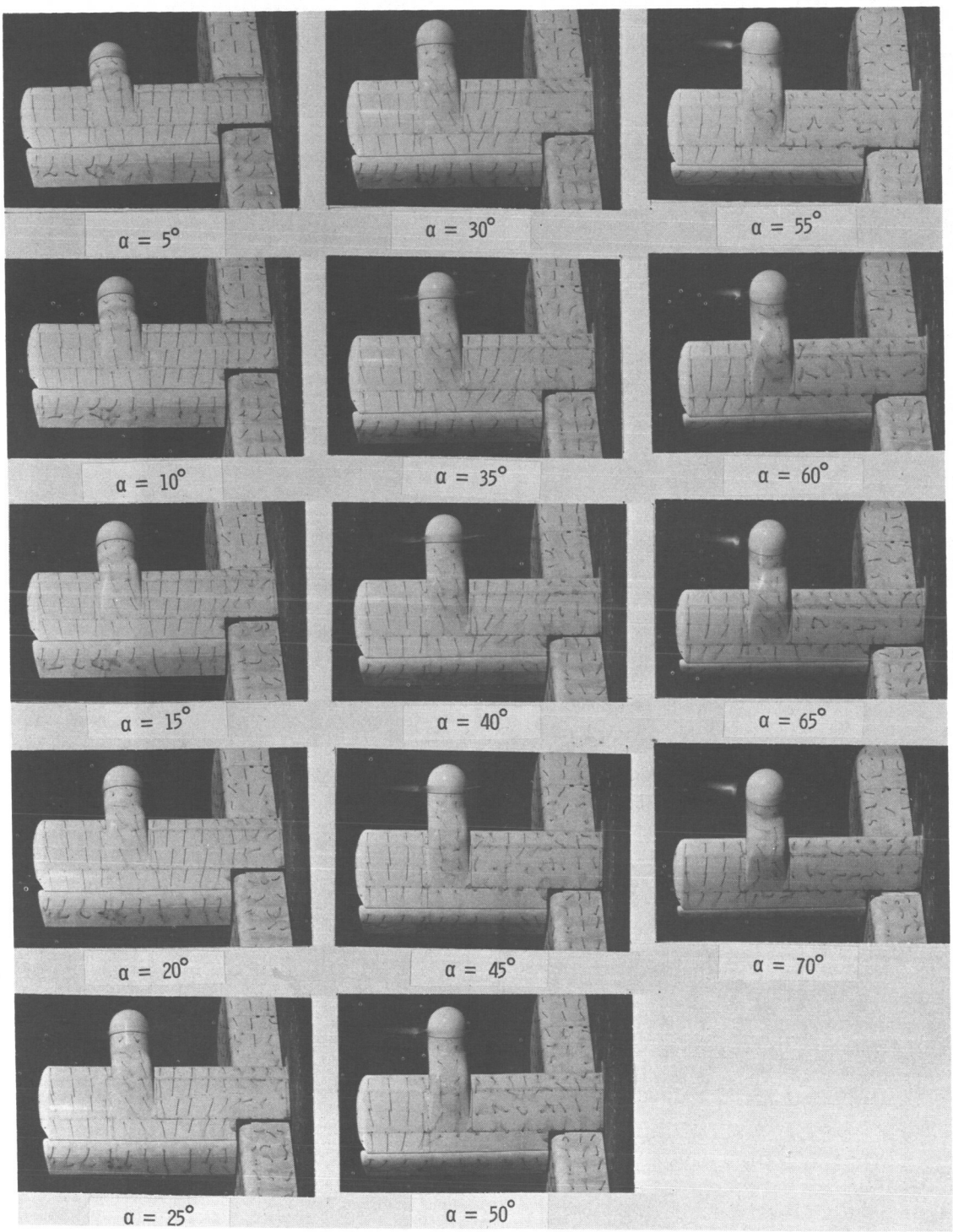
(a) Aerodynamic characteristics.

Figure 27.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, basic leading edge, and $\delta_f = 40^o$.



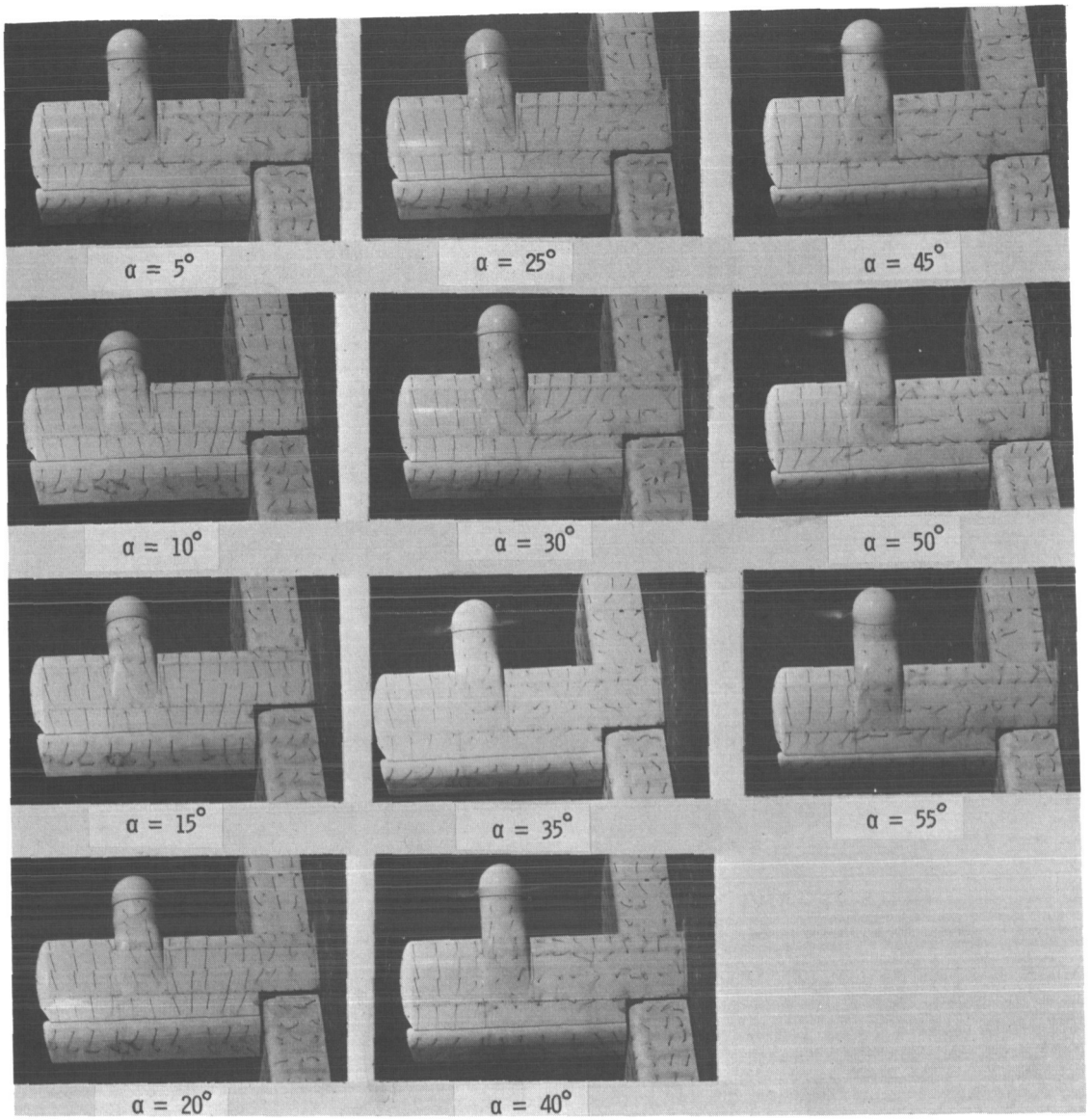
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 27.- Continued.



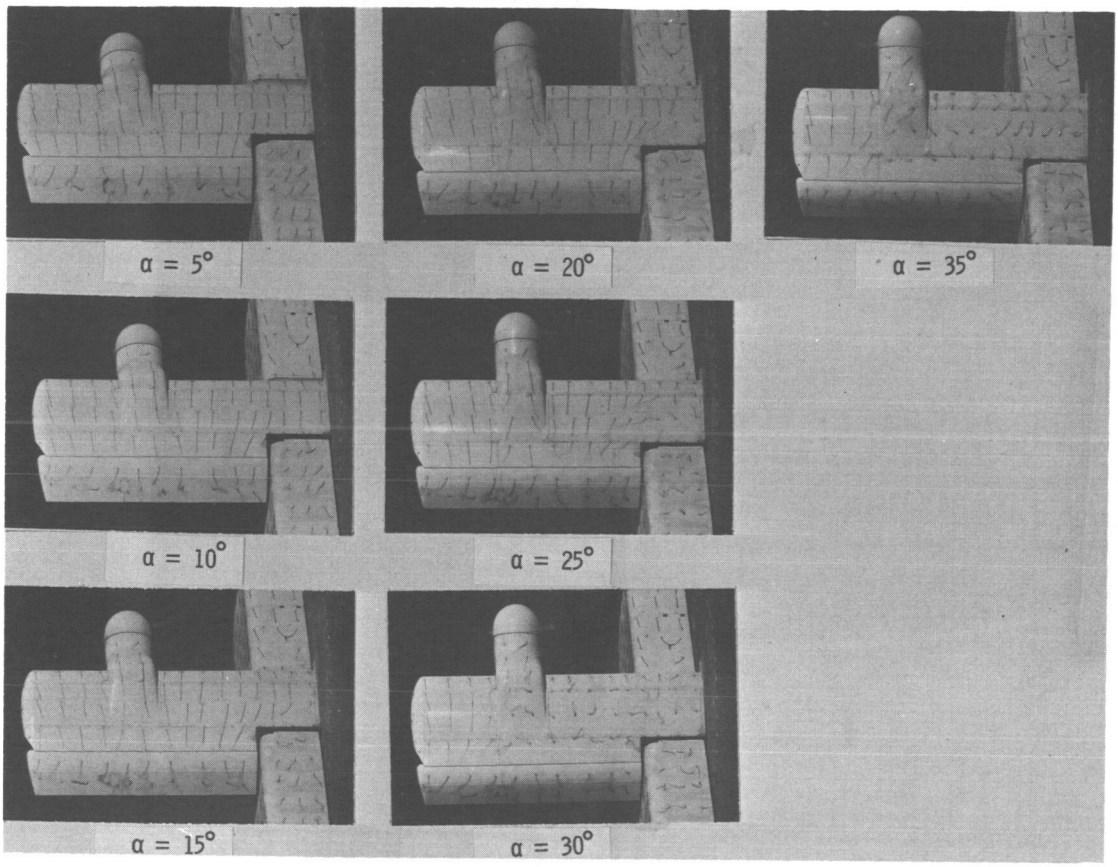
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 27.- Continued.



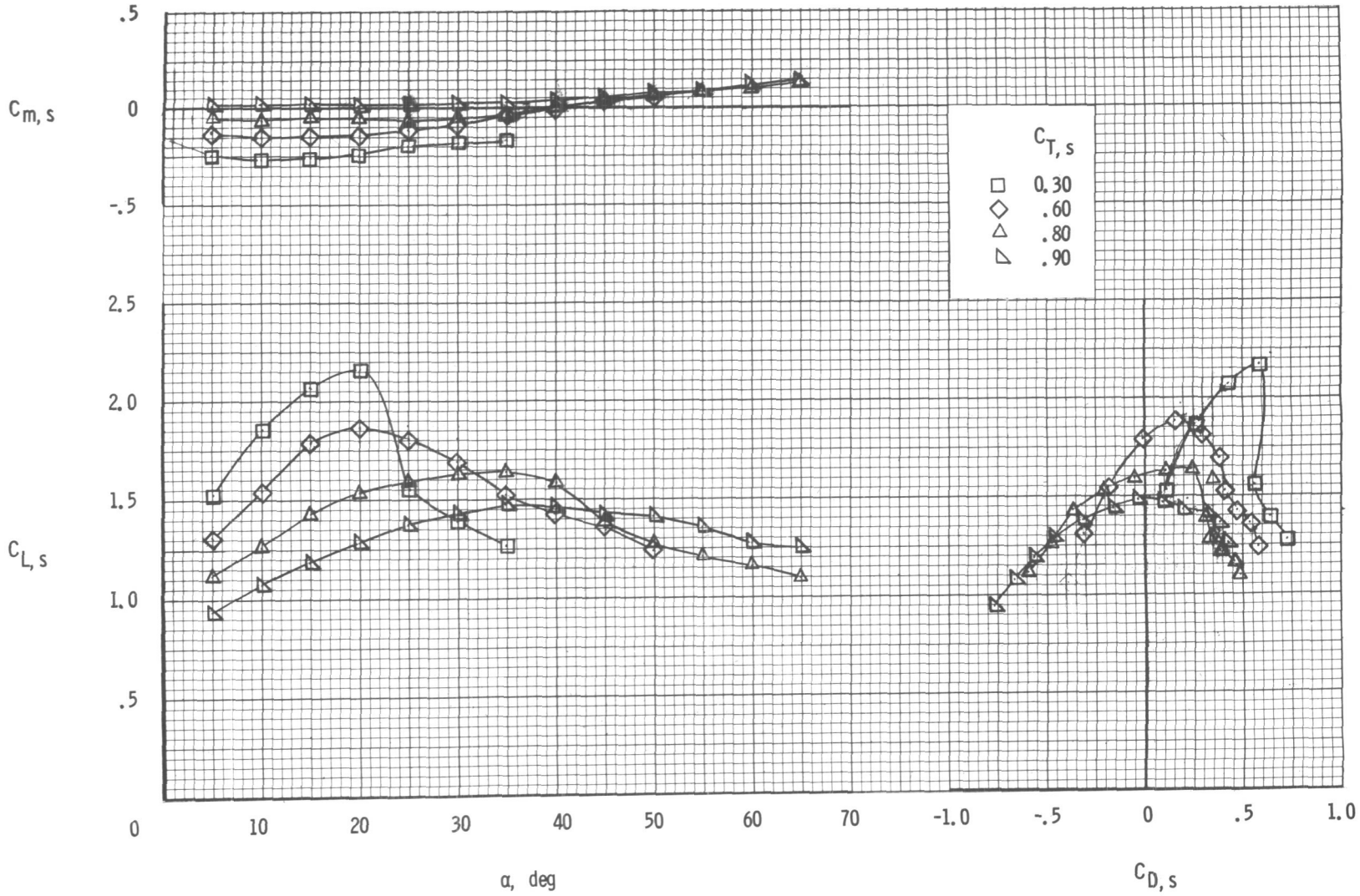
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 27.- Continued.



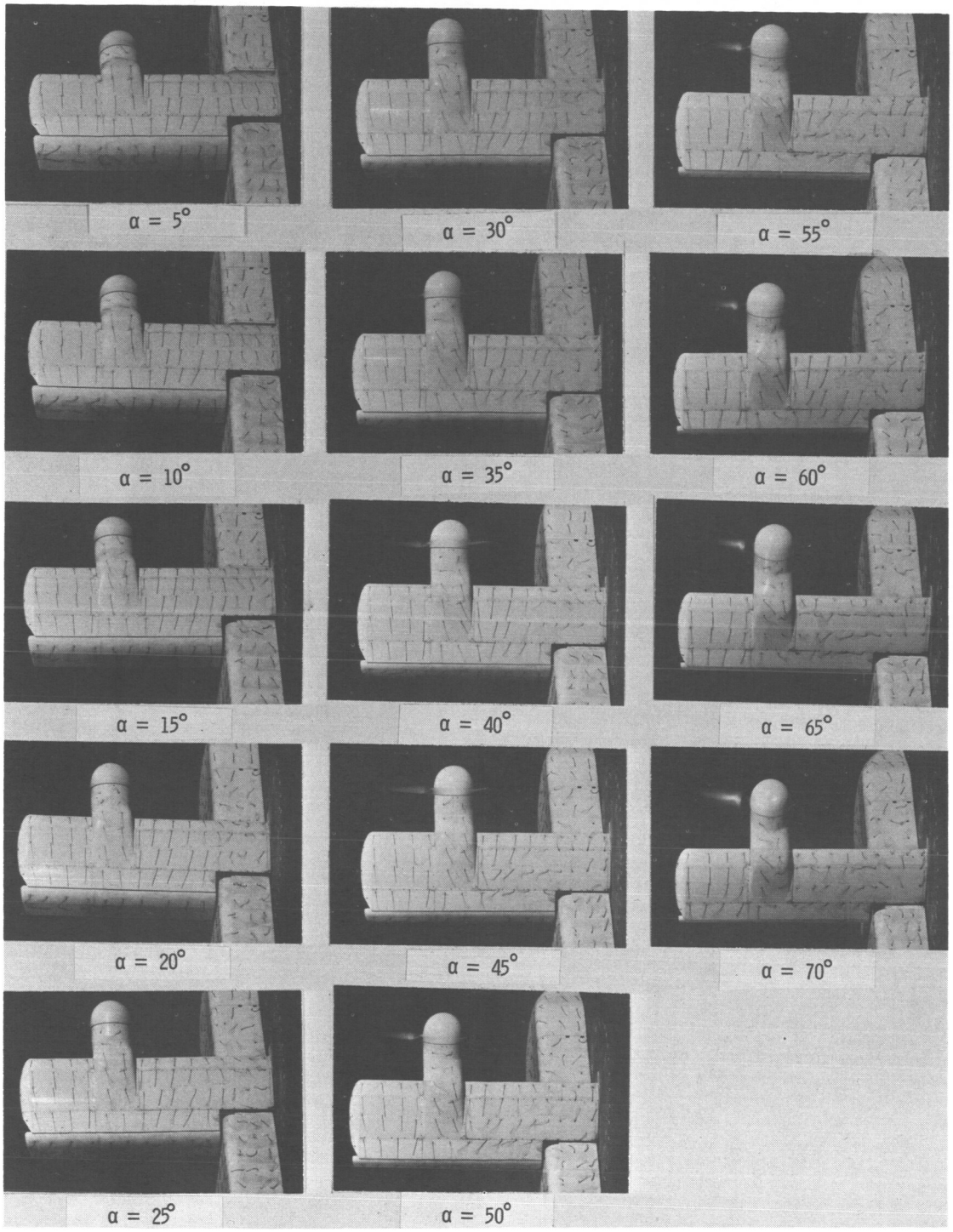
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 27.- Concluded.



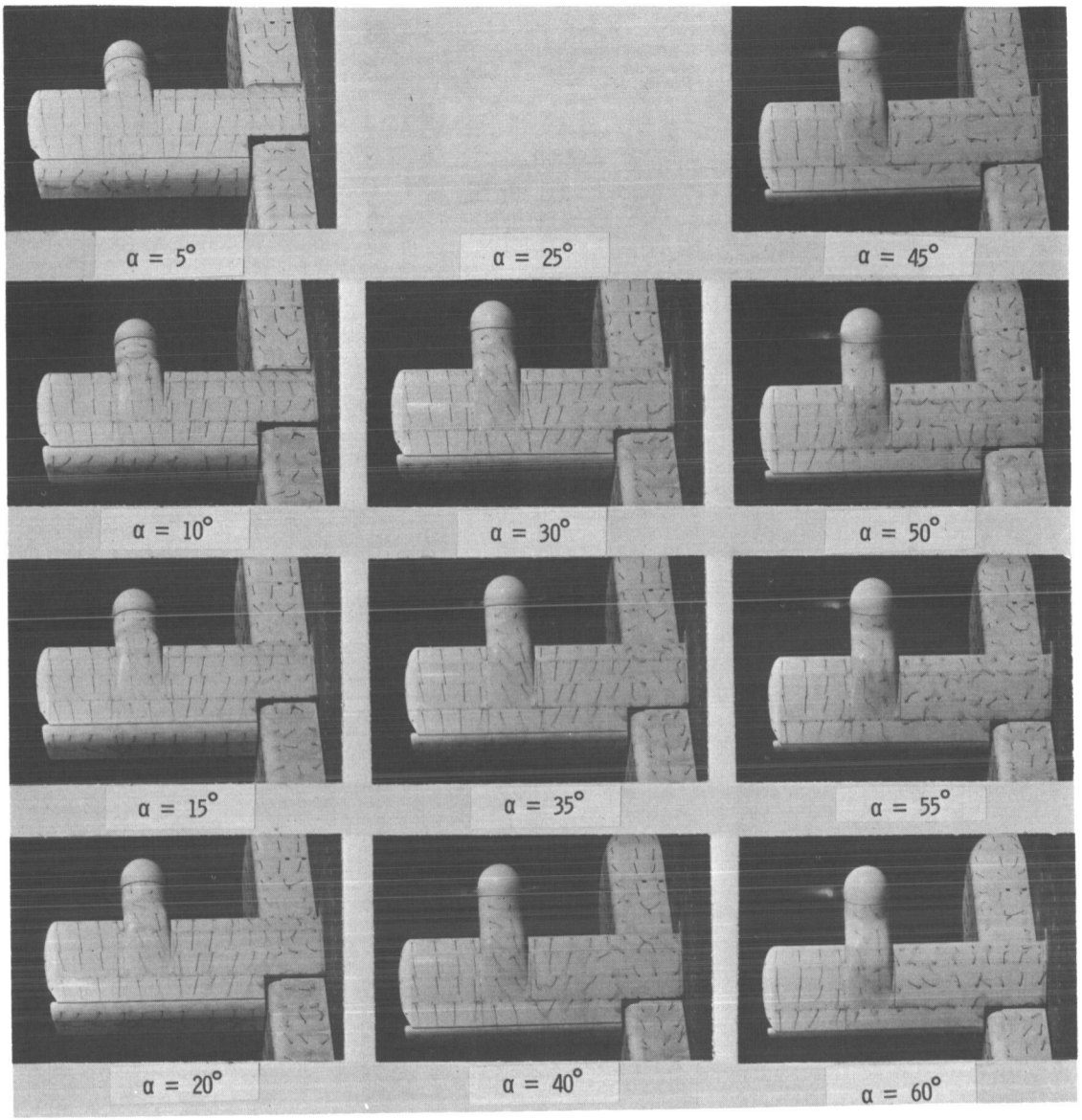
(a) Aerodynamic characteristics.

Figure 28.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, basic leading edge, and $\delta_f = 60^o$.



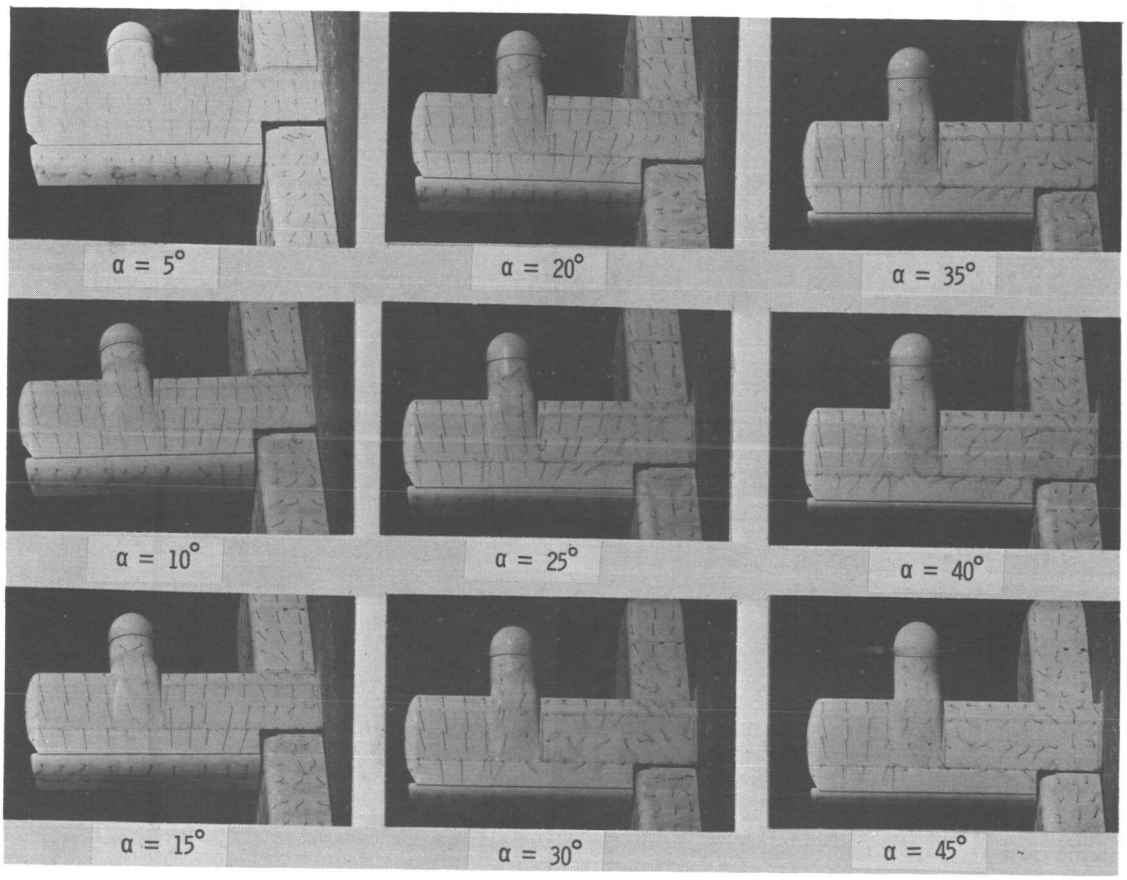
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 28.- Continued.



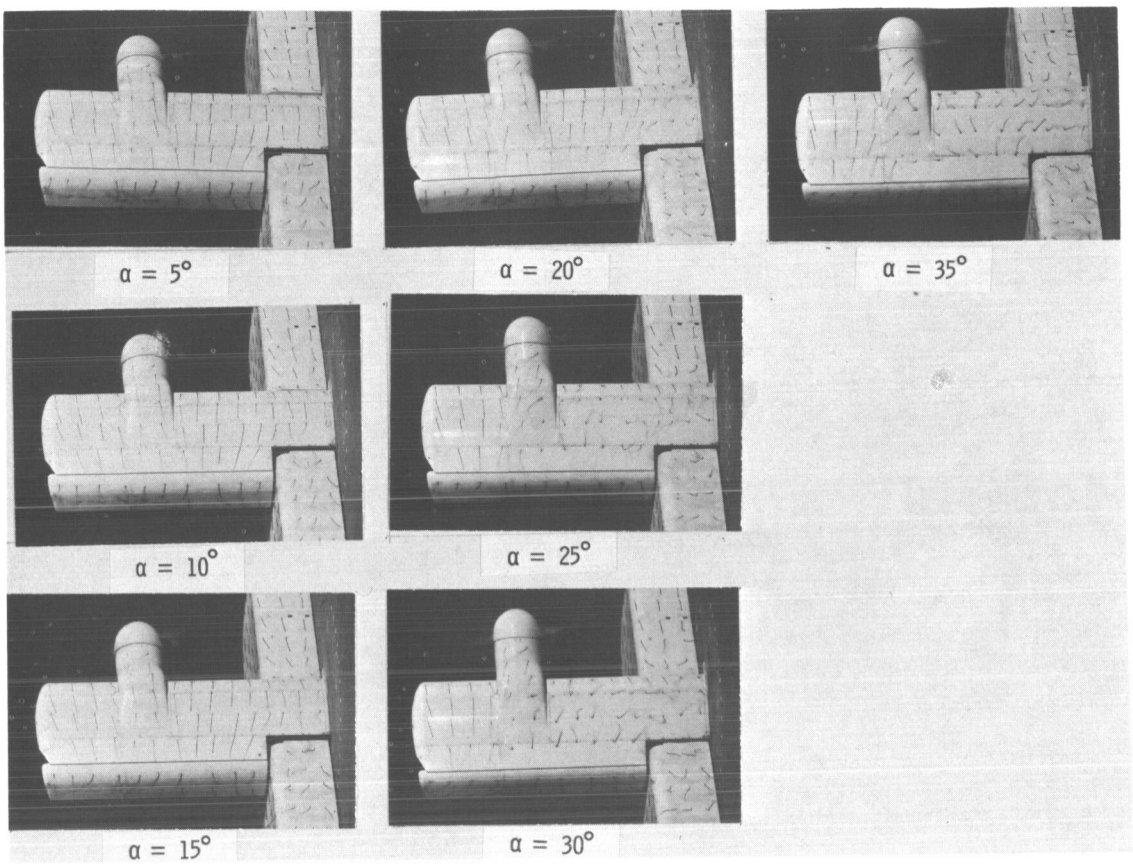
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 28.- Continued.



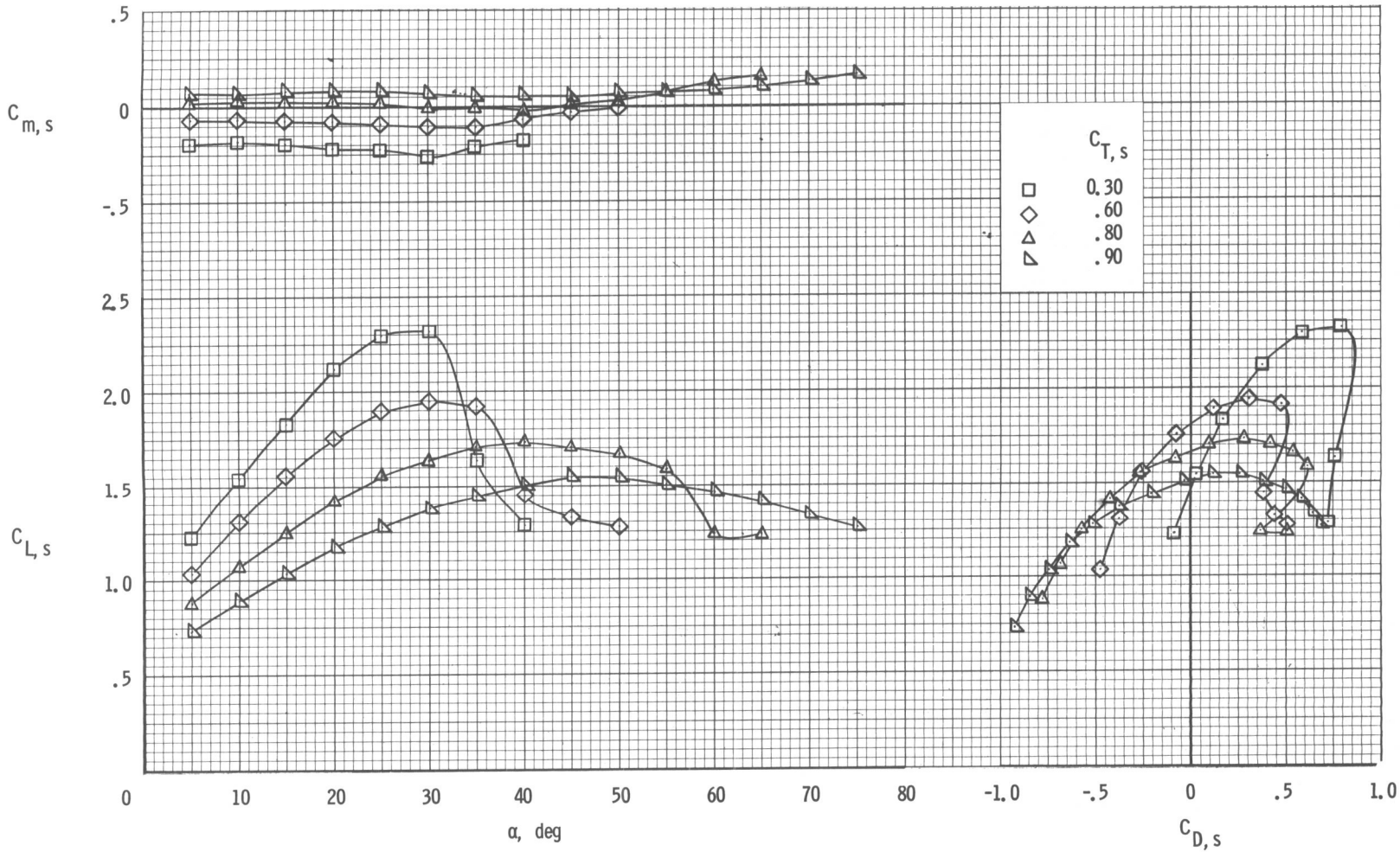
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 28.- Continued.



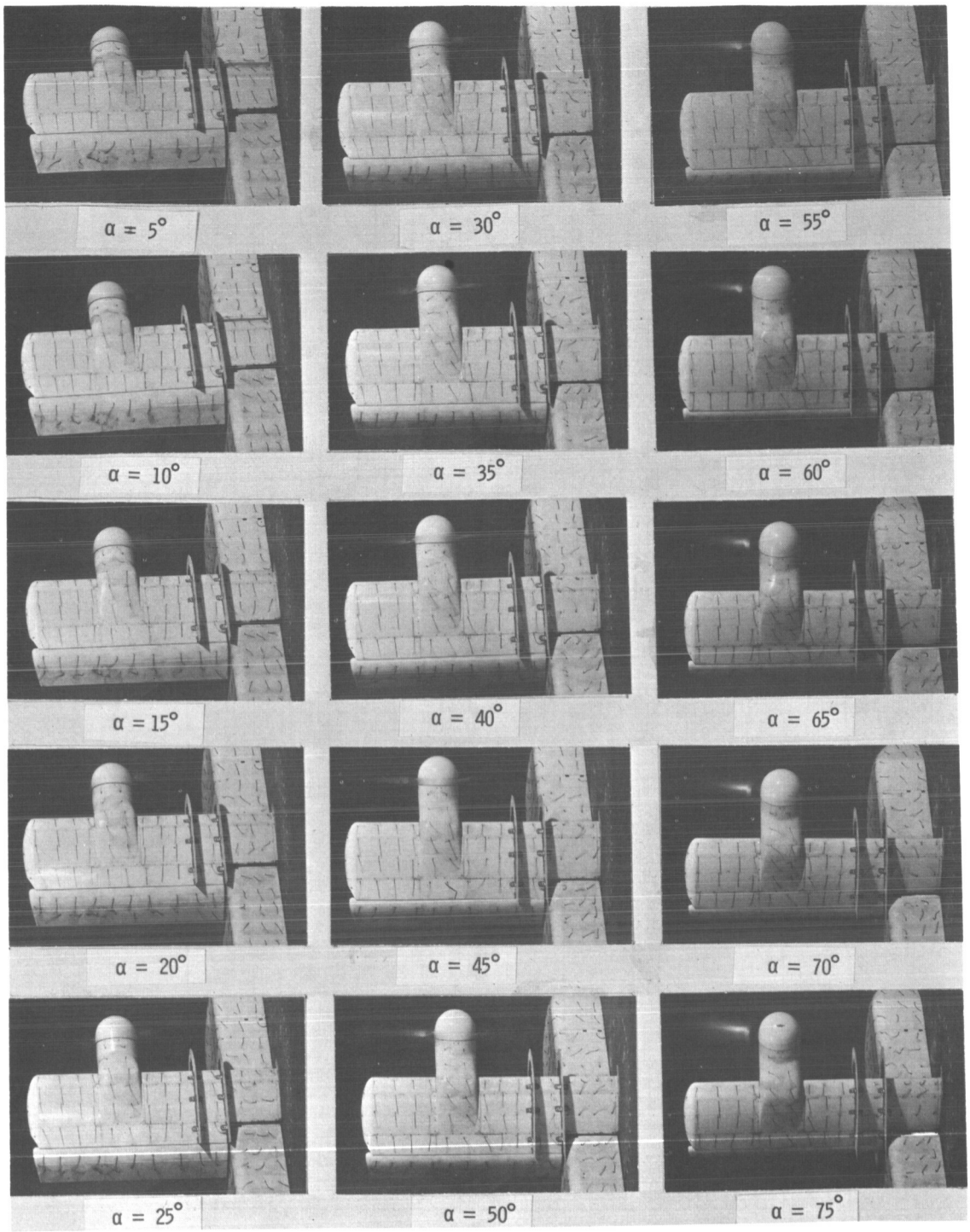
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 28.- Concluded.



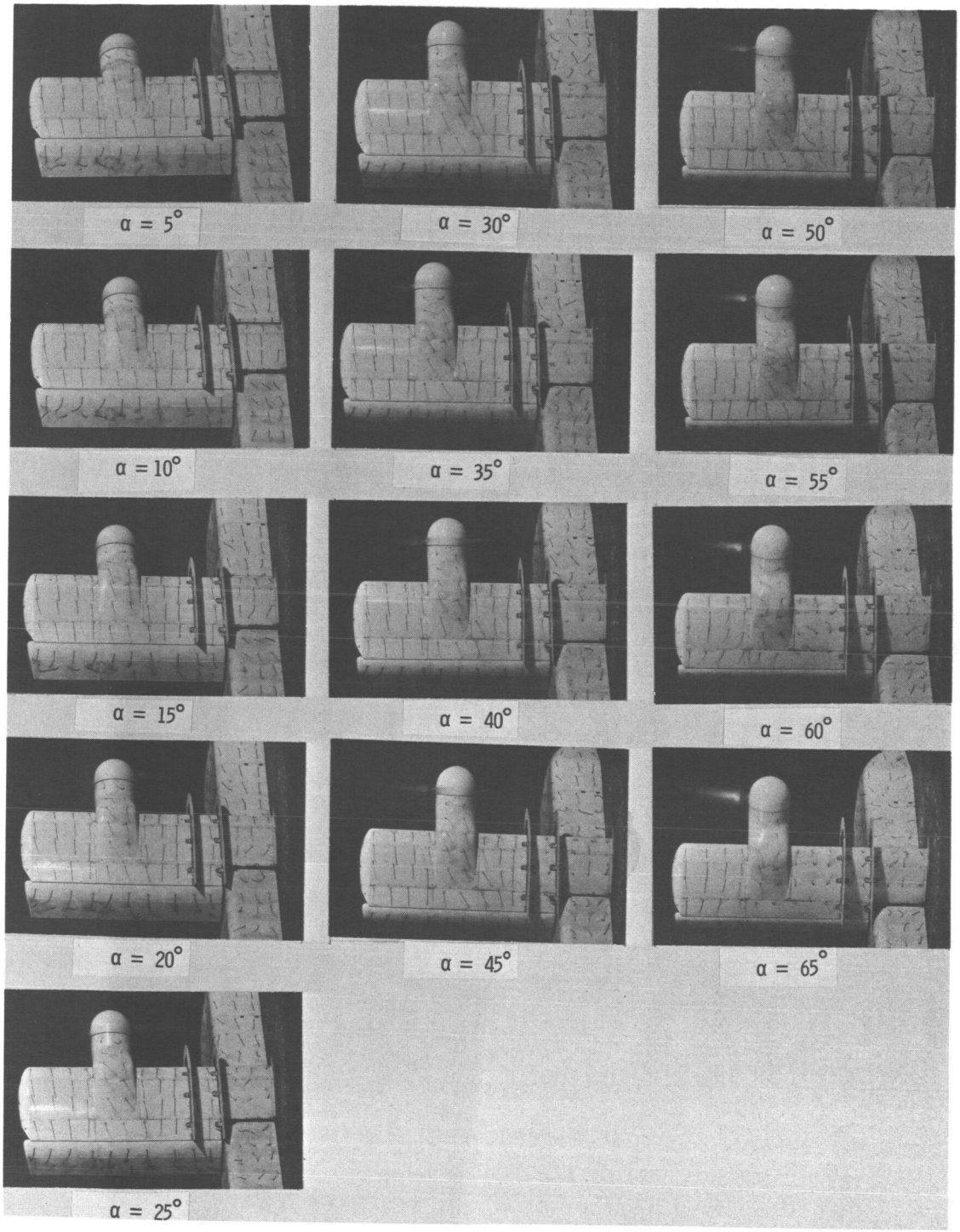
(a) Aerodynamic characteristics.

Figure 29.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, basic leading edge, fences on, and $\delta_f = 40^o$.



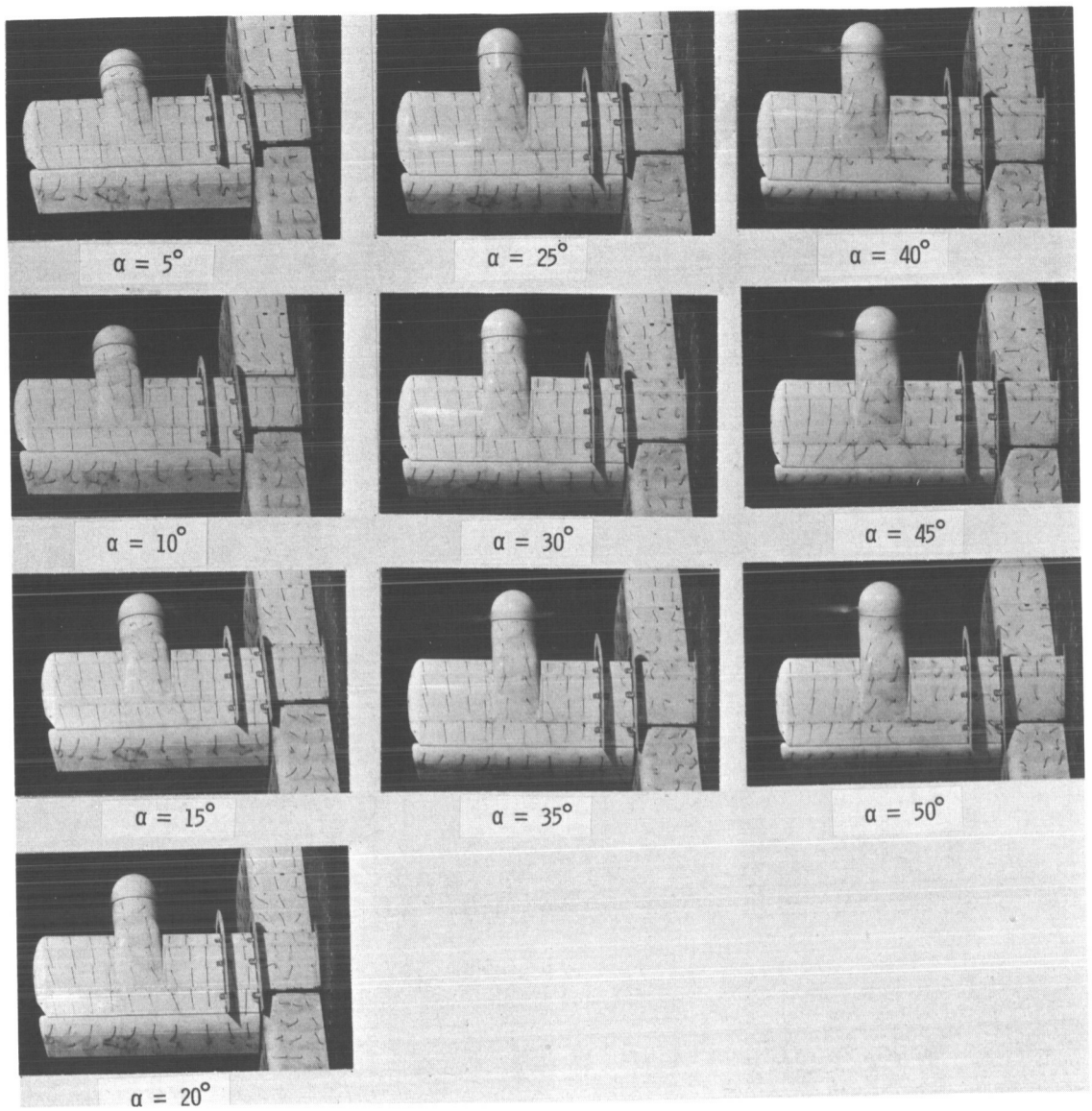
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 29.- Continued.



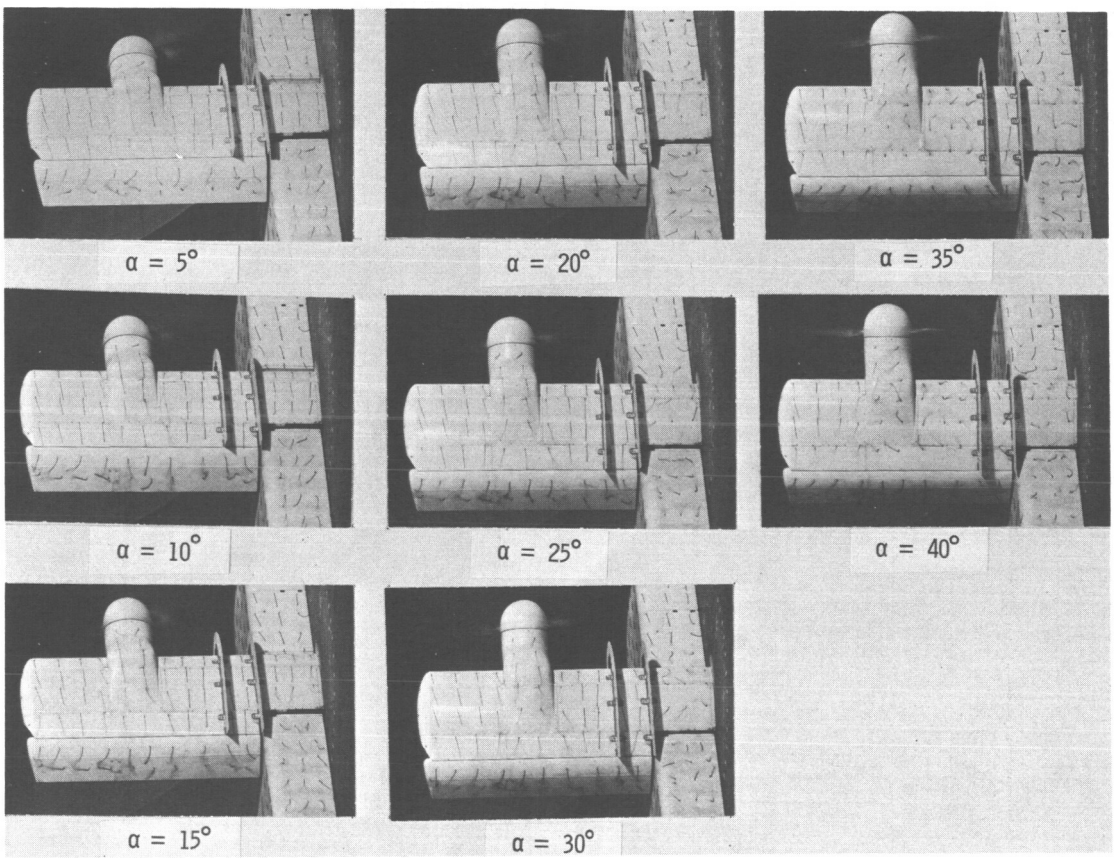
(c) Flow characteristics; $C_{T,s} = 0.80$.

Figure 29.- Continued.



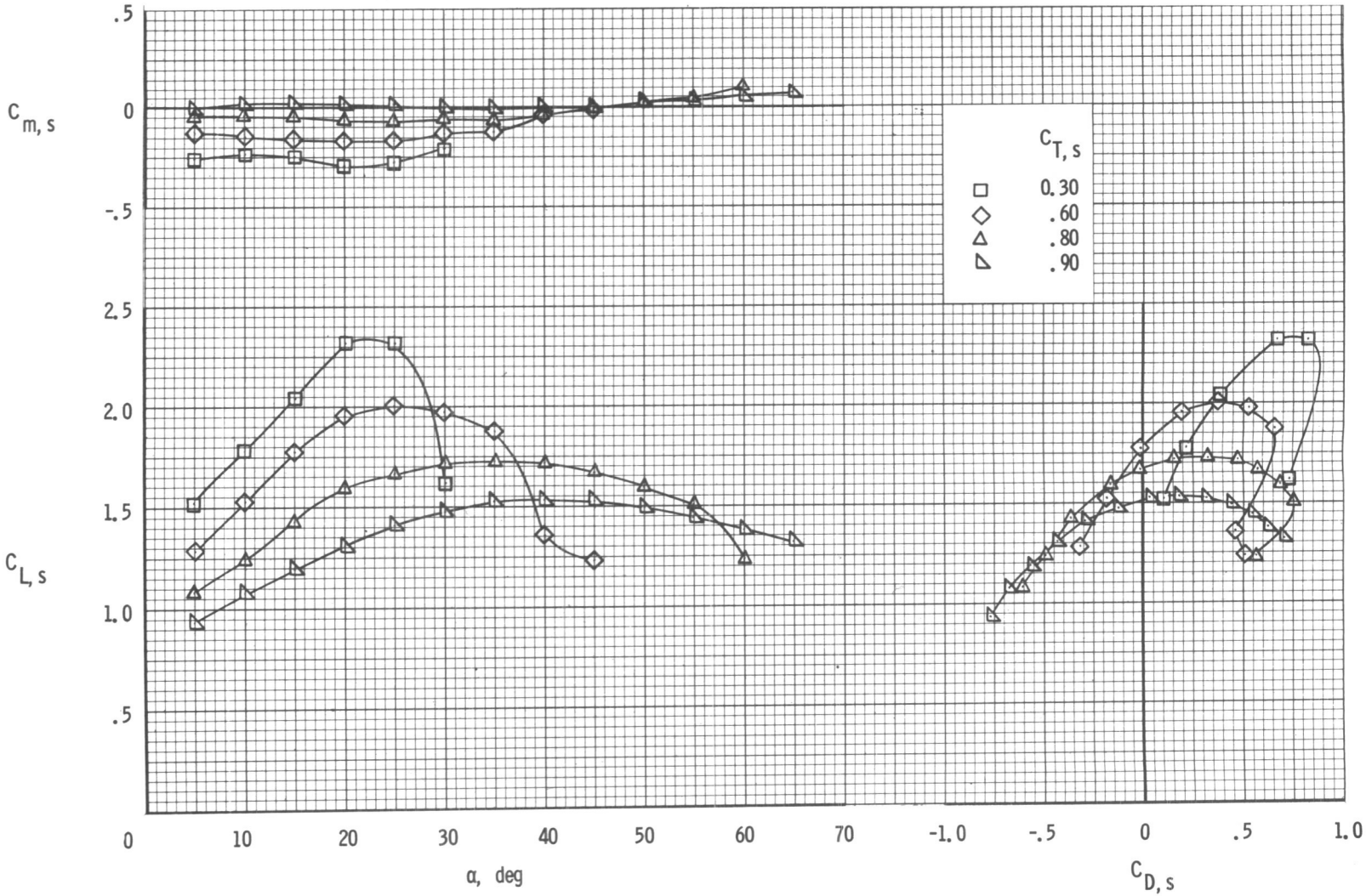
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 29.- Continued.



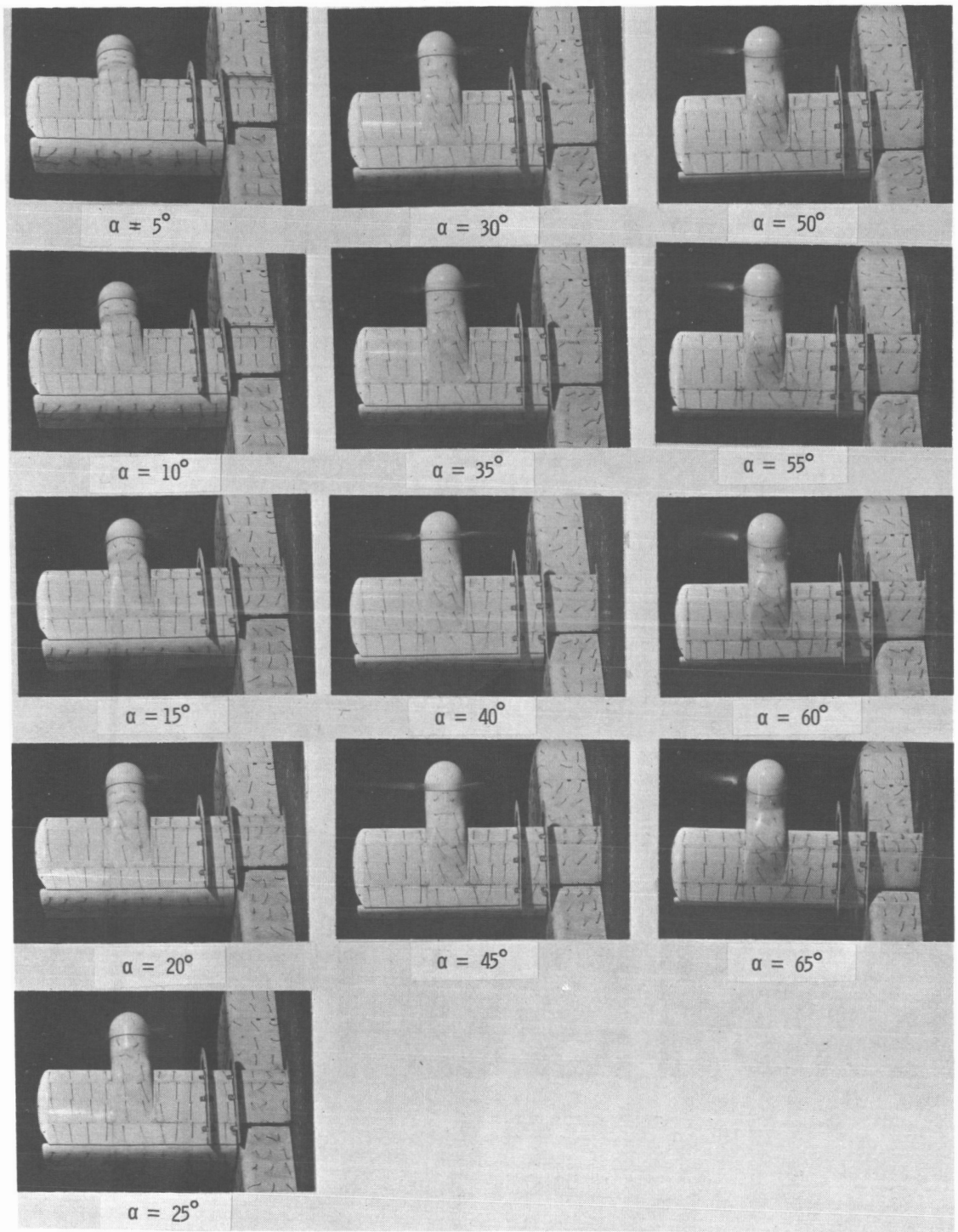
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 29.- Concluded.



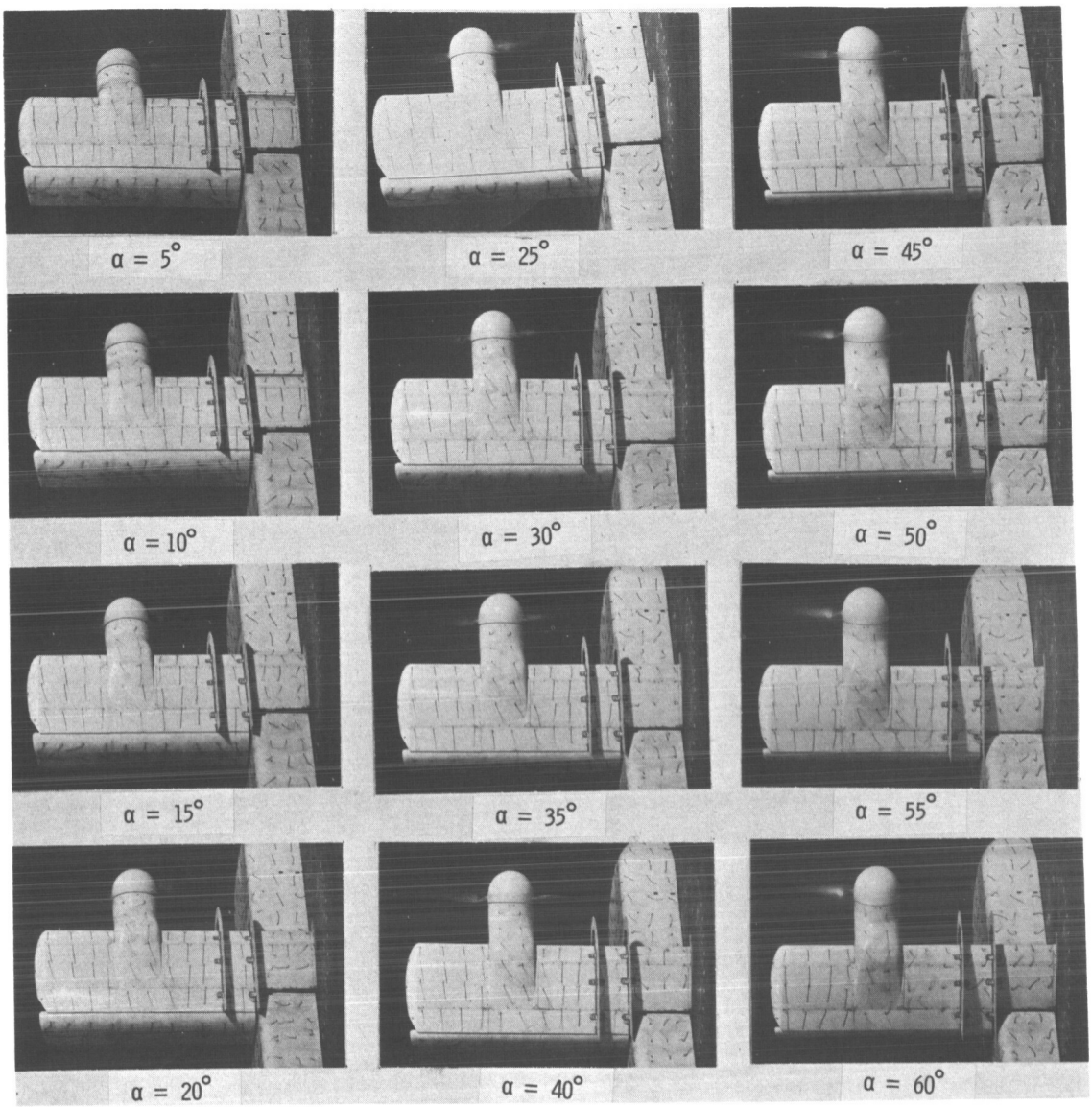
(a) Aerodynamic characteristics.

Figure 30.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, basic leading edge, fences on, and $\delta_f = 60^o$.



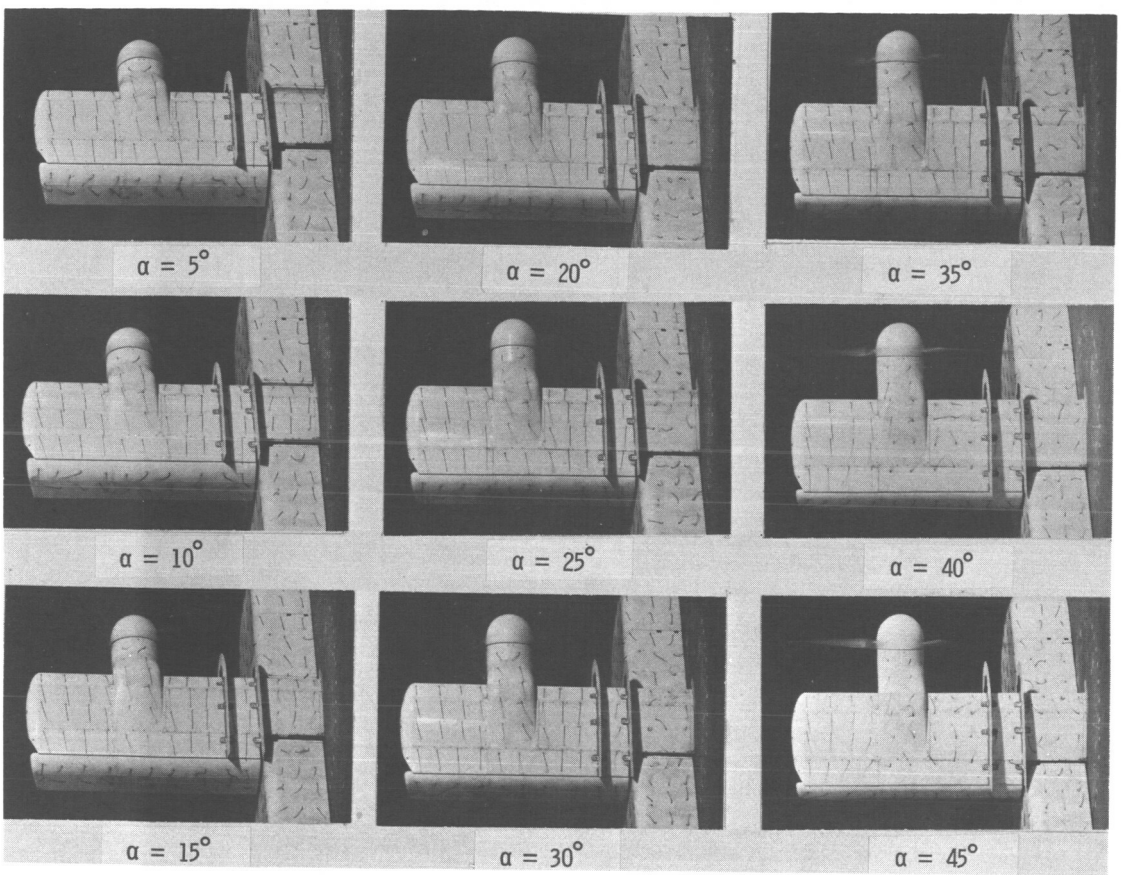
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 30.- Continued.



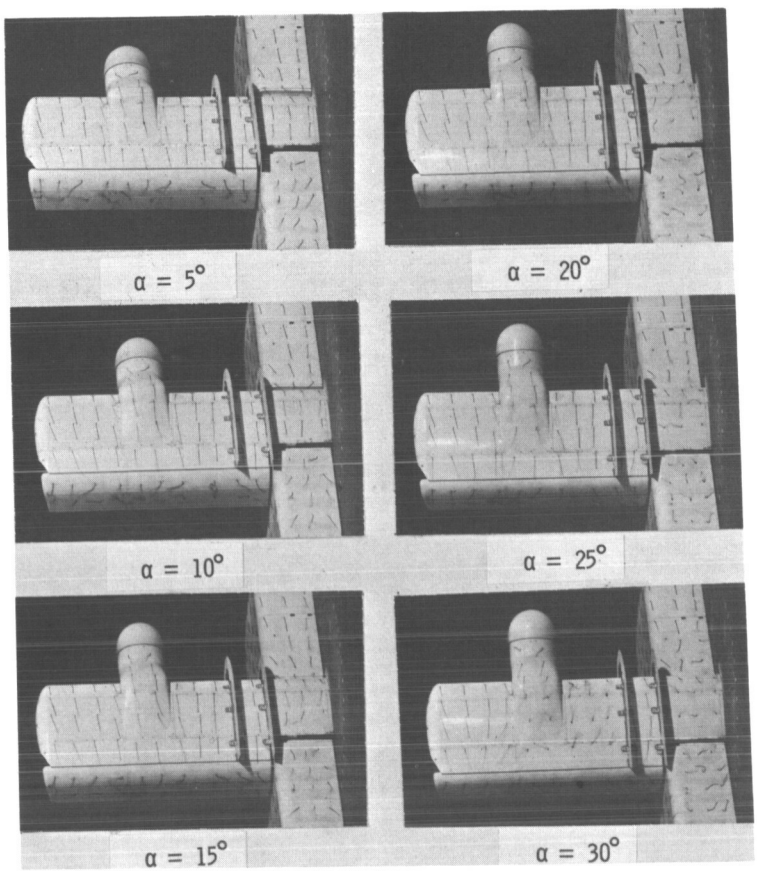
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 30.- Continued.



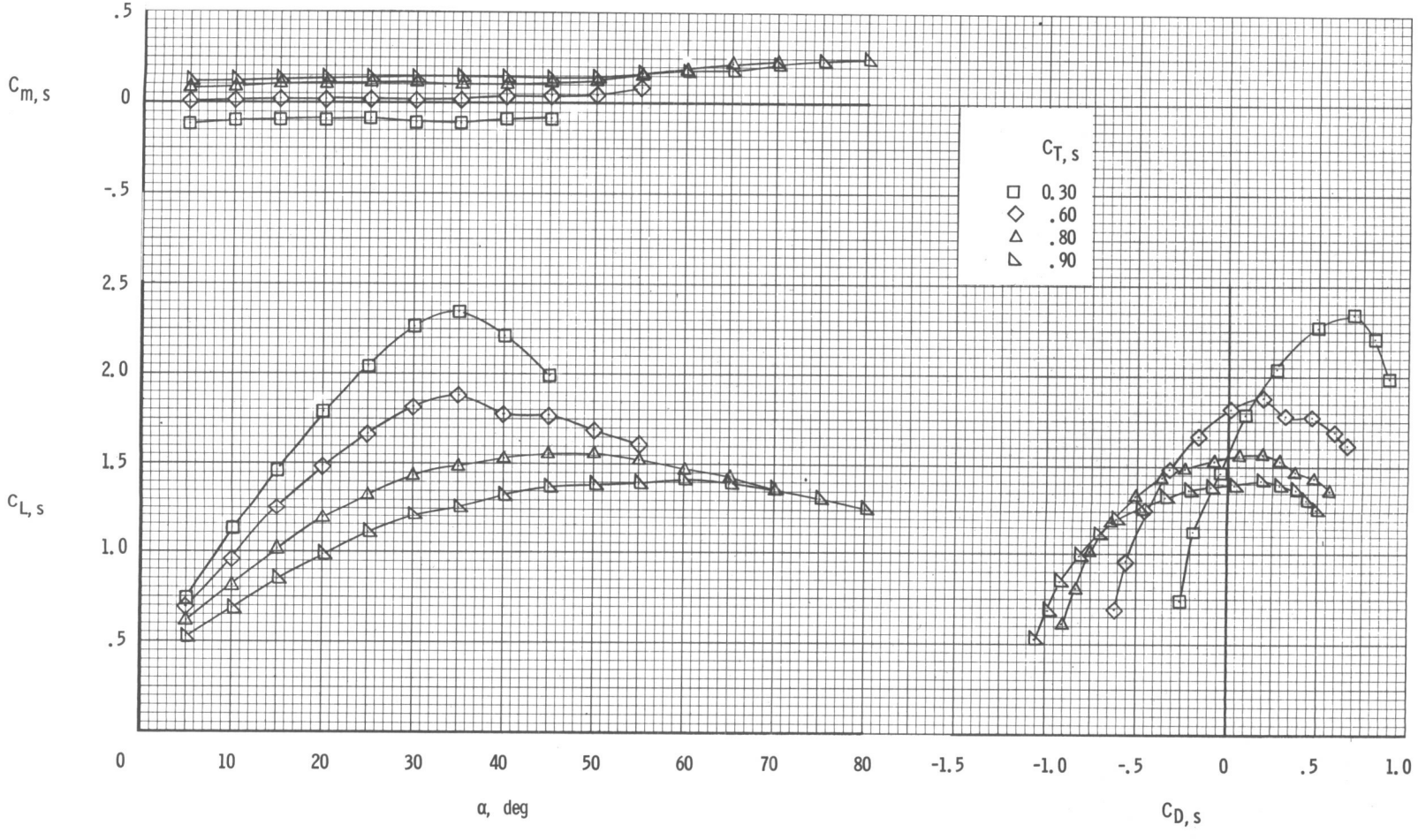
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 30.- Continued.



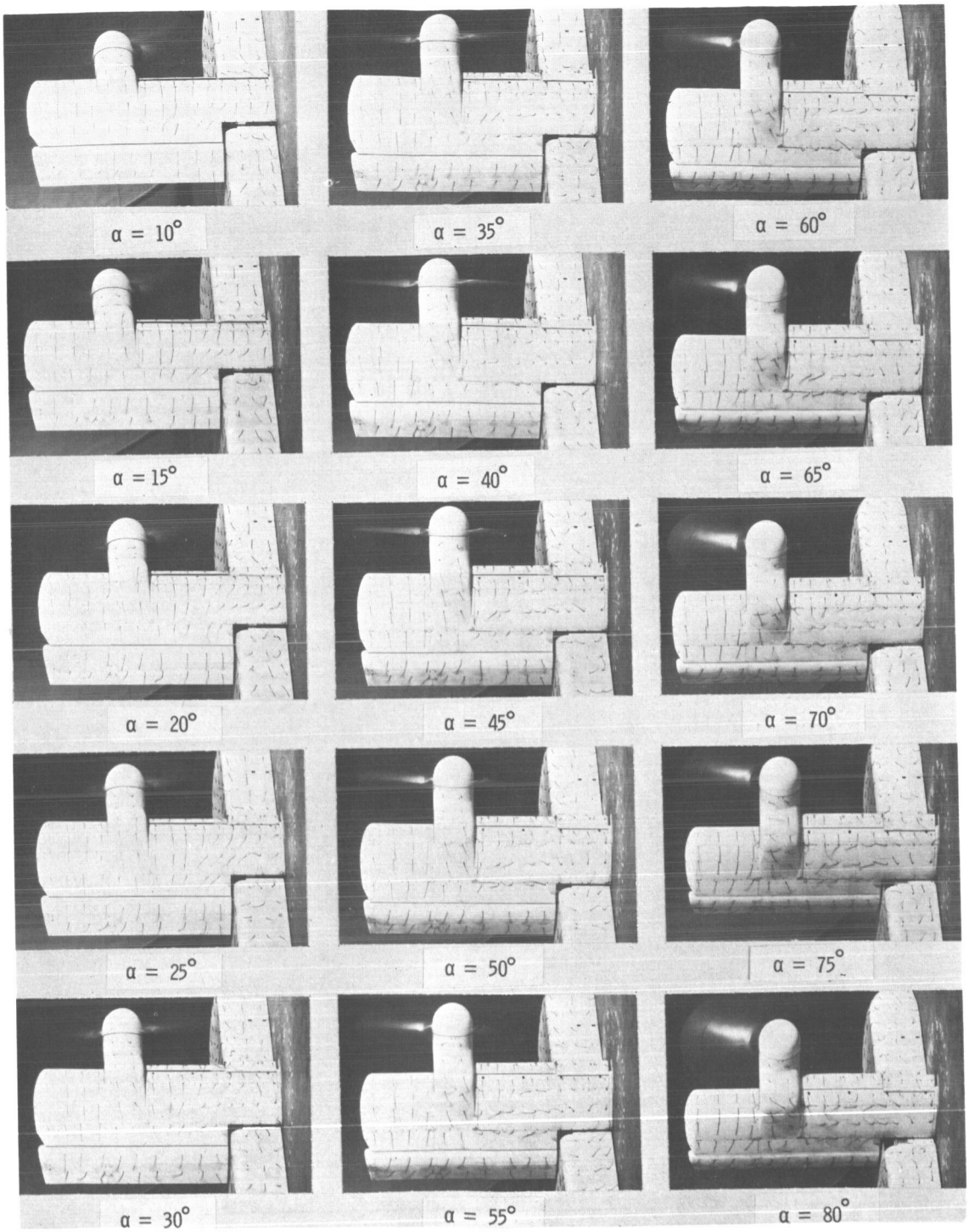
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 30.- Concluded.



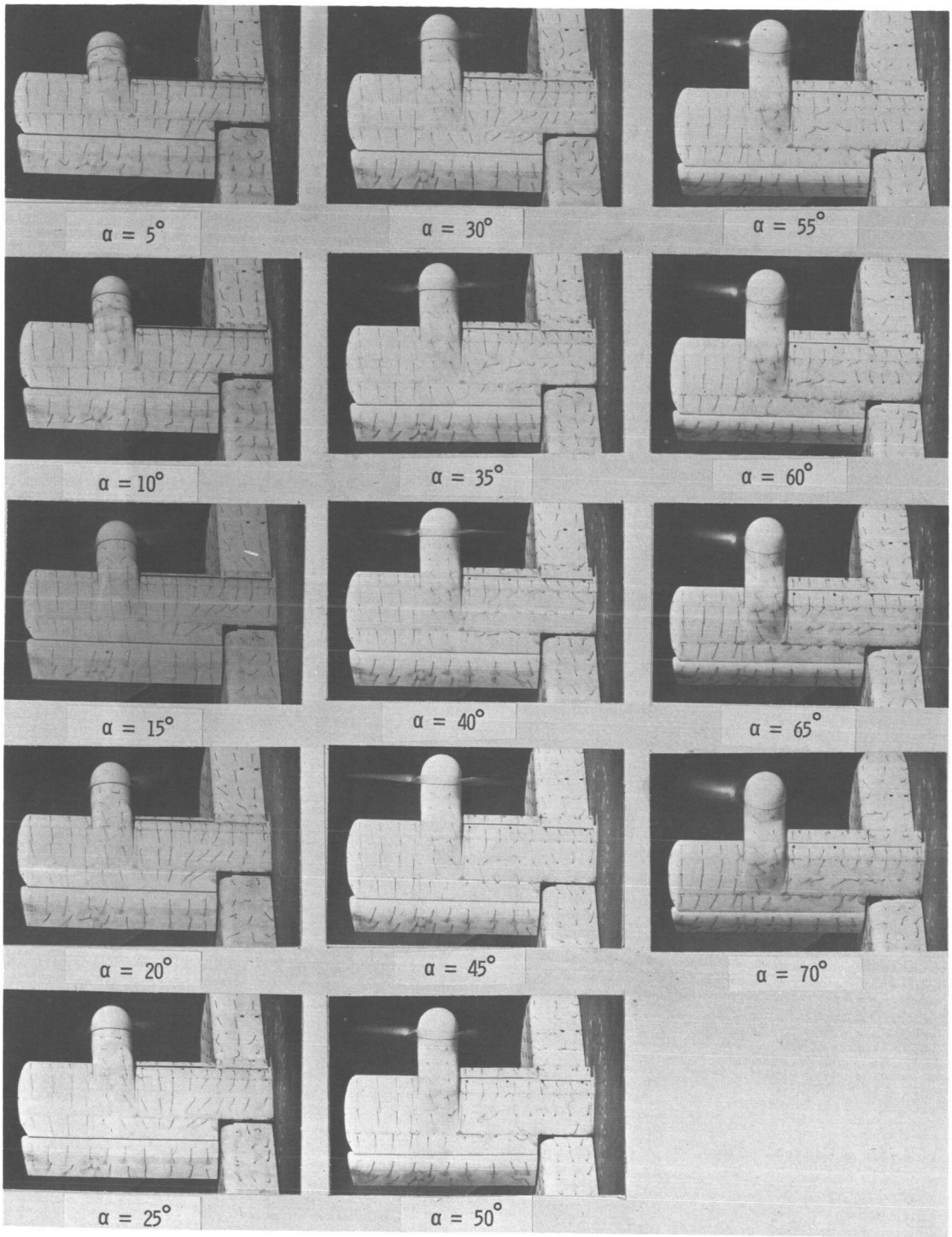
(a) Aerodynamic characteristics.

Figure 31.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, inboard slat on, and $\delta_f = 20^o$.



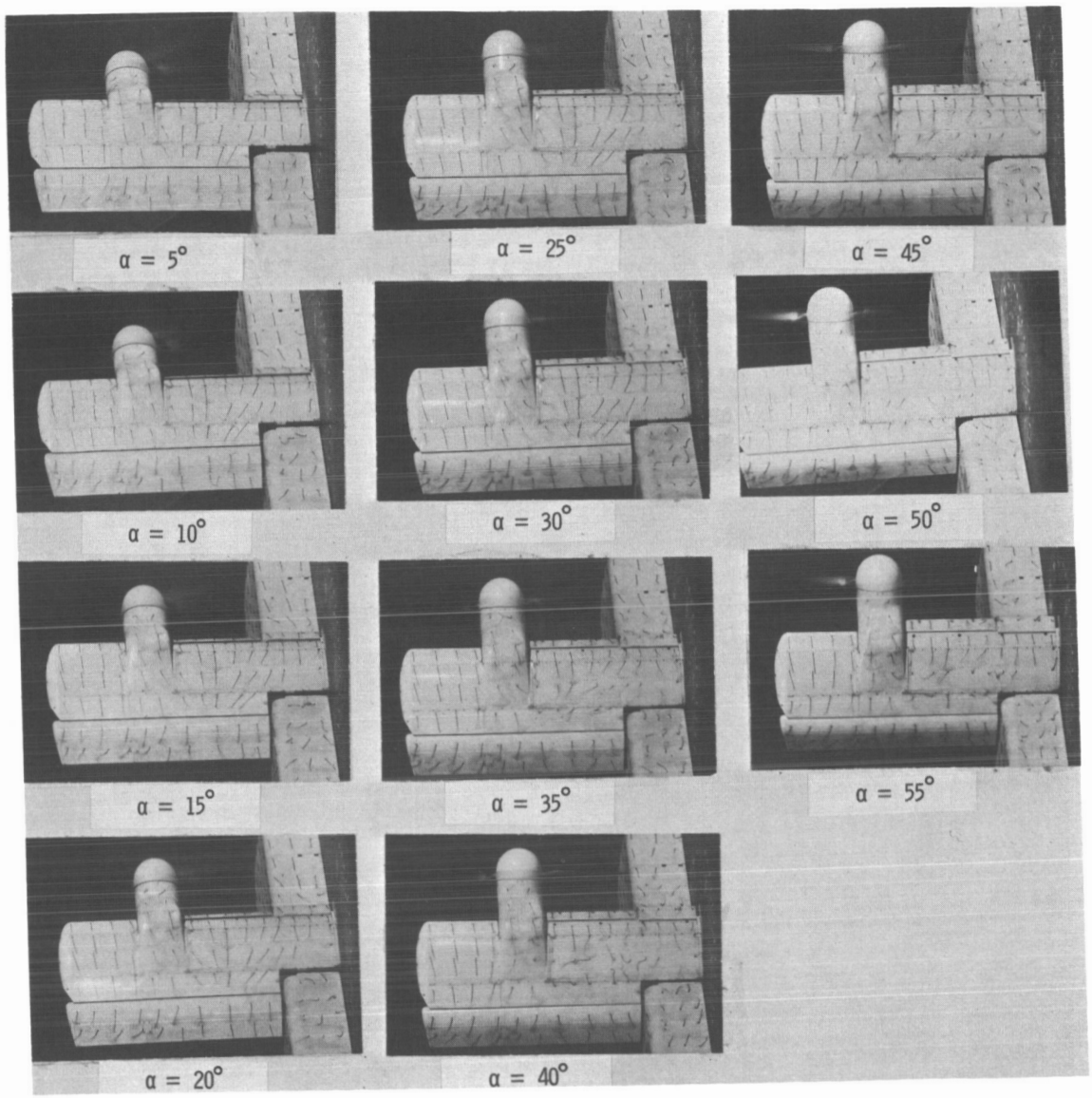
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 31.- Continued.



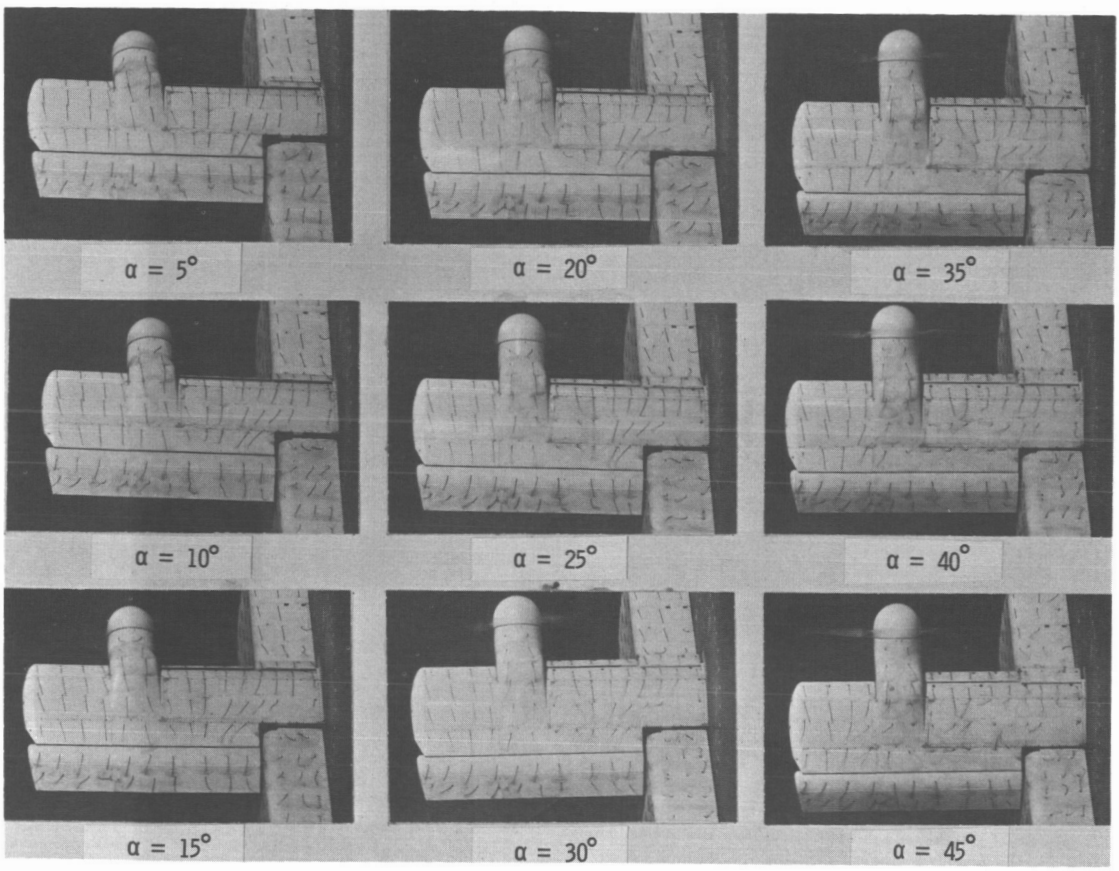
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 31.- Continued.



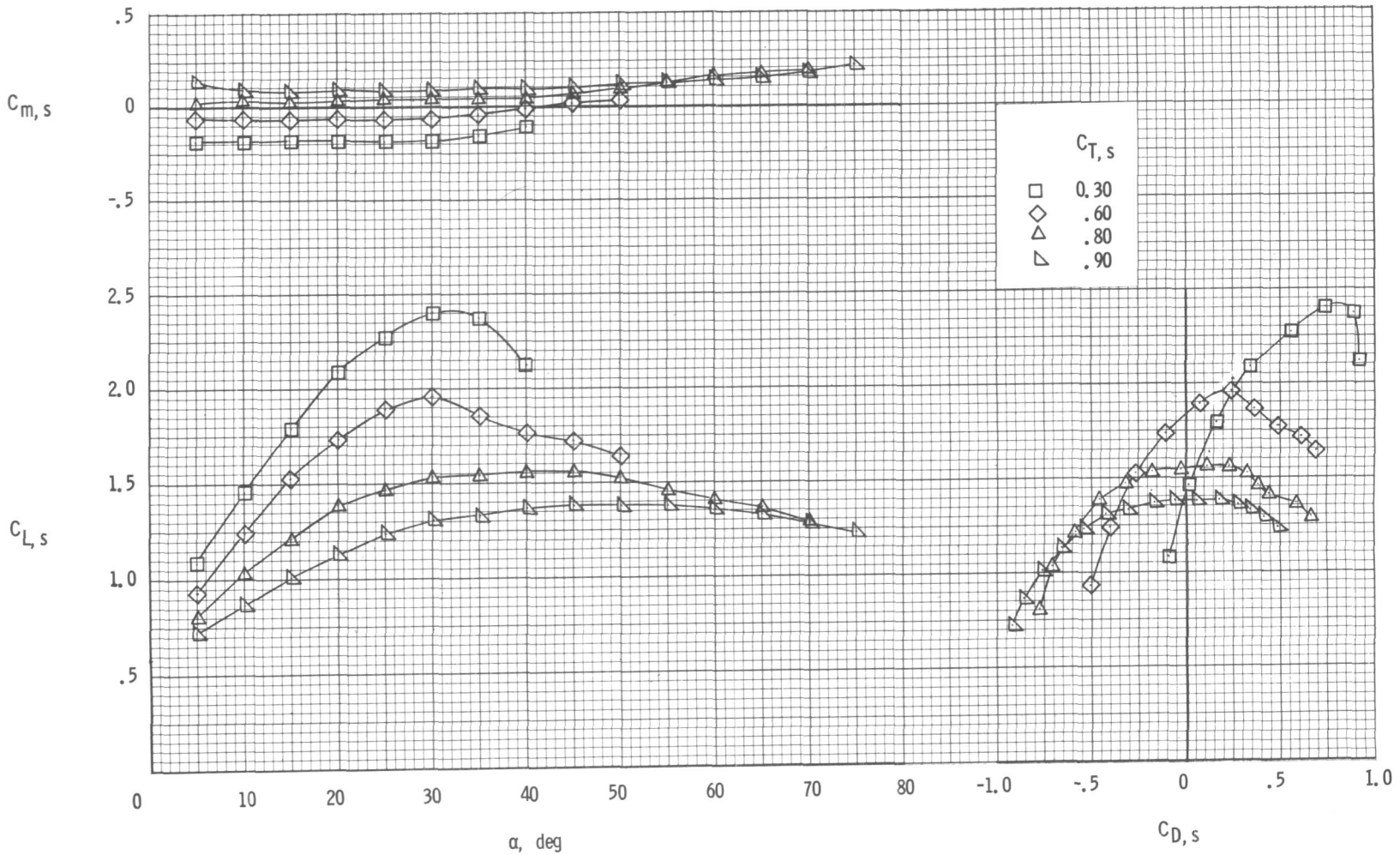
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 31.- Continued.



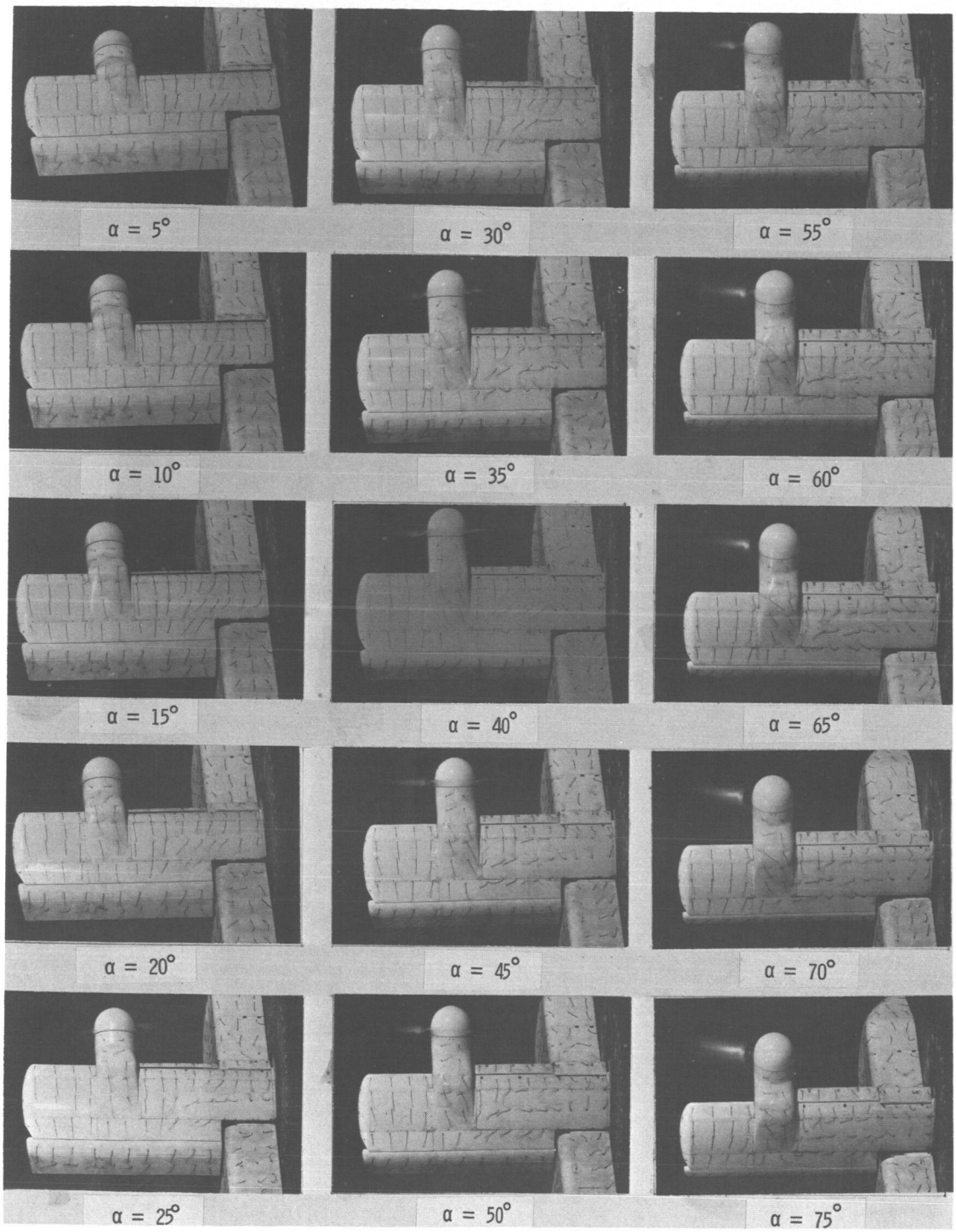
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 31.- Concluded.



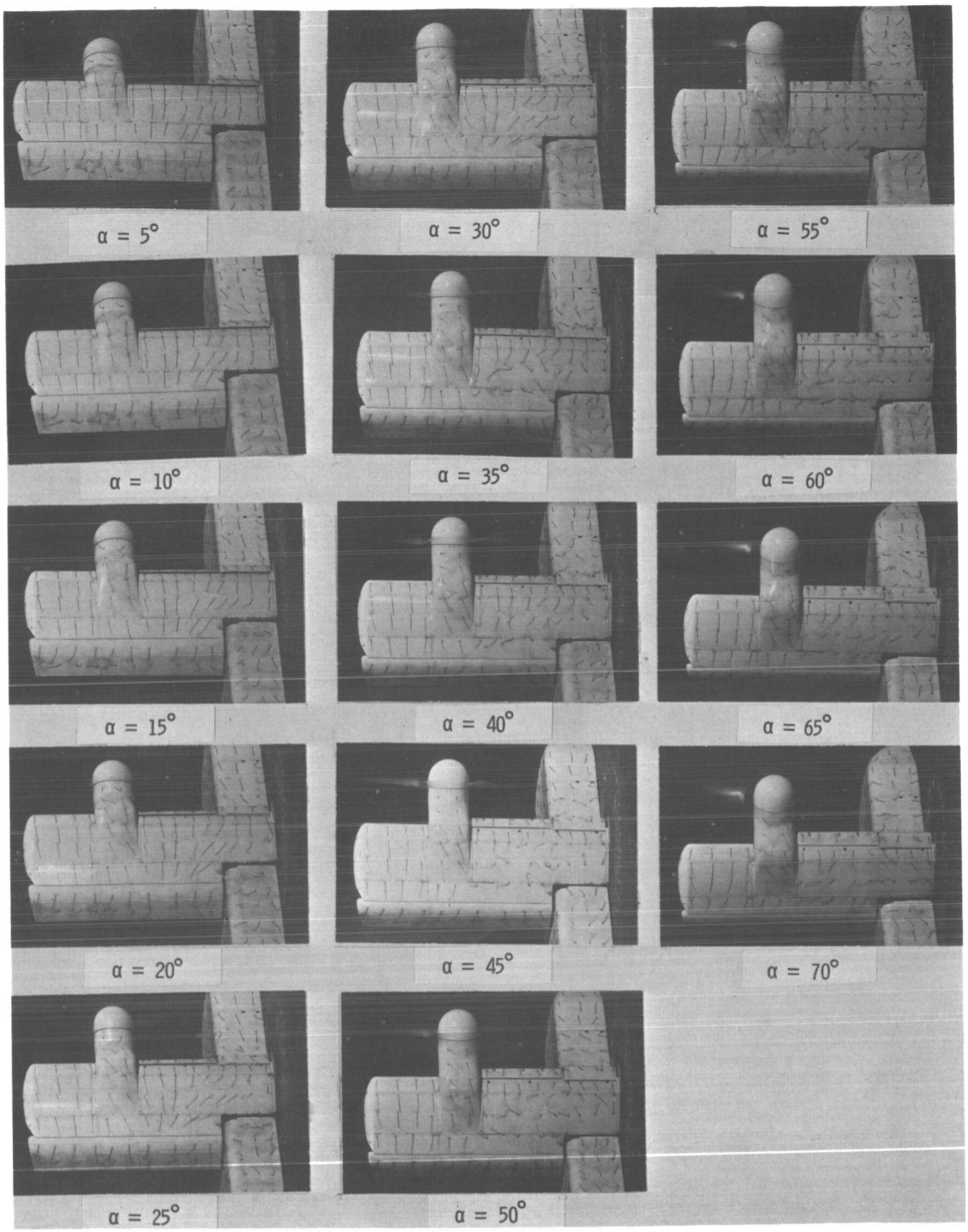
(a) Aerodynamic characteristics.

Figure 32.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, inboard slat on, and $\delta_f = 40^o$.



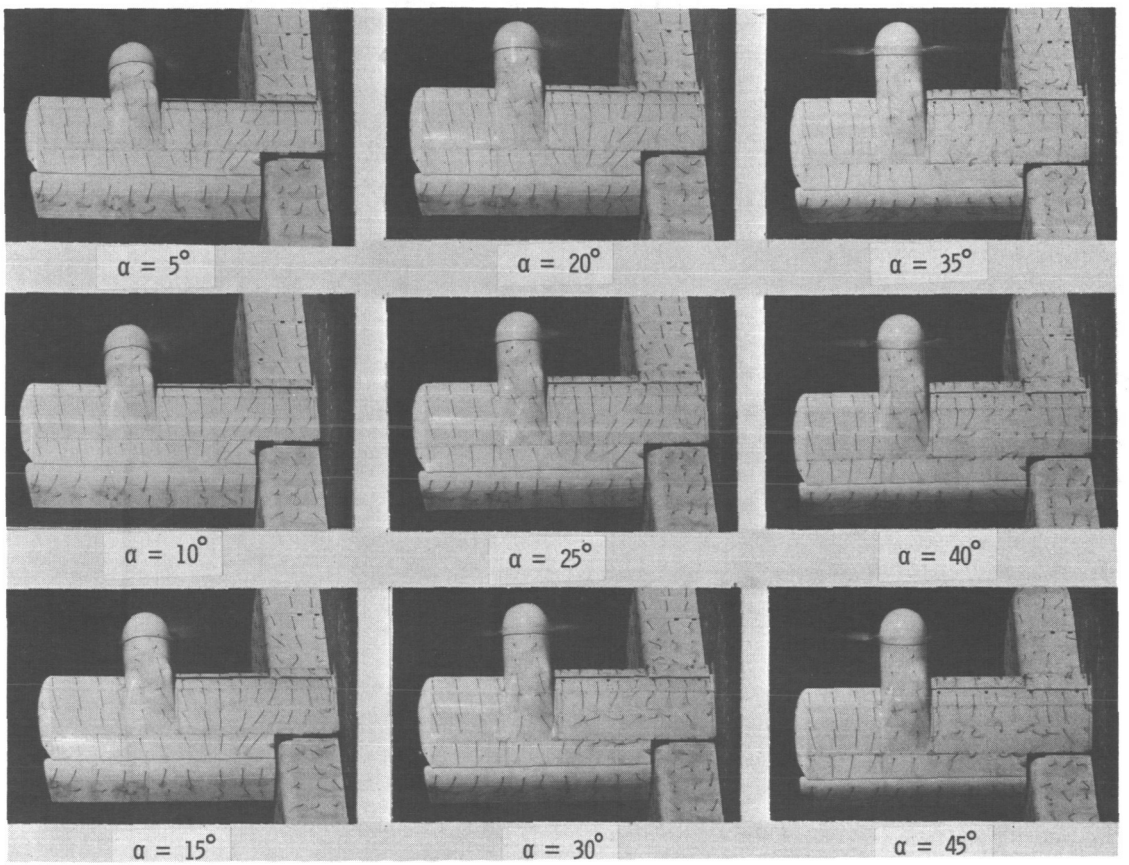
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 32.- Continued.



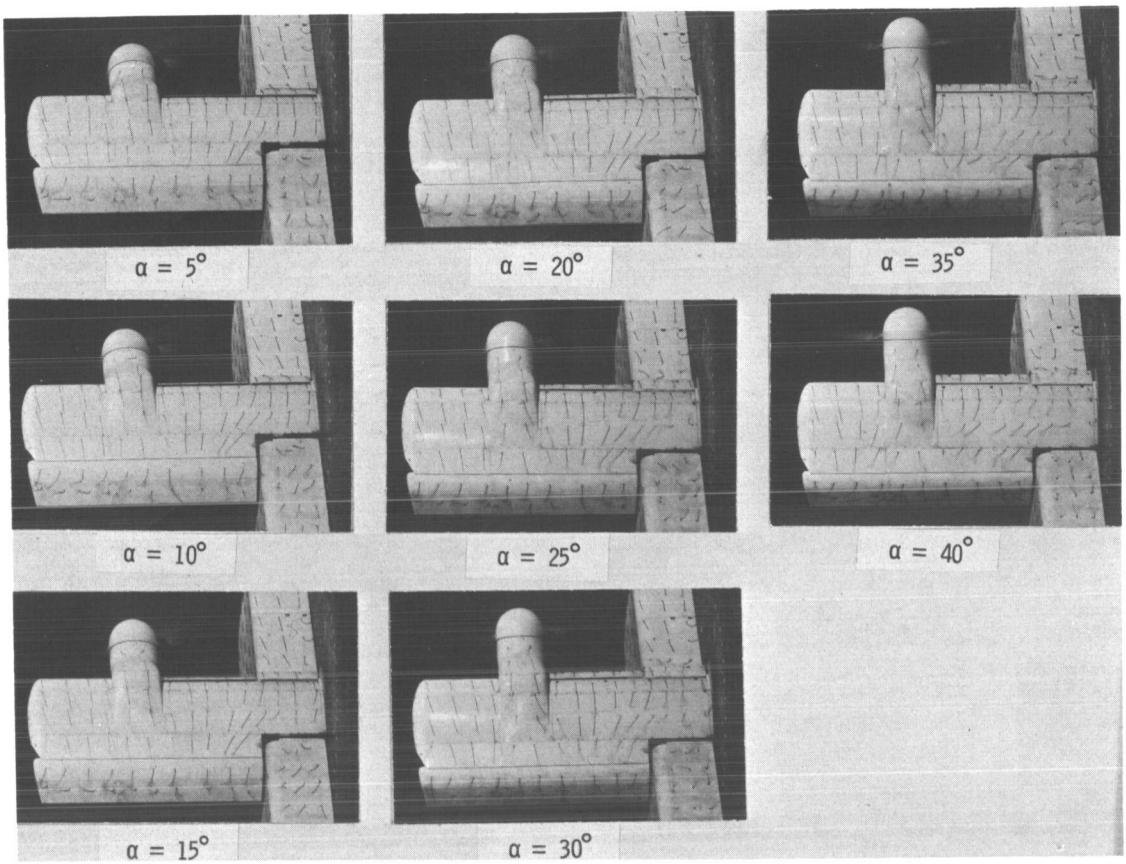
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 32.- Continued.



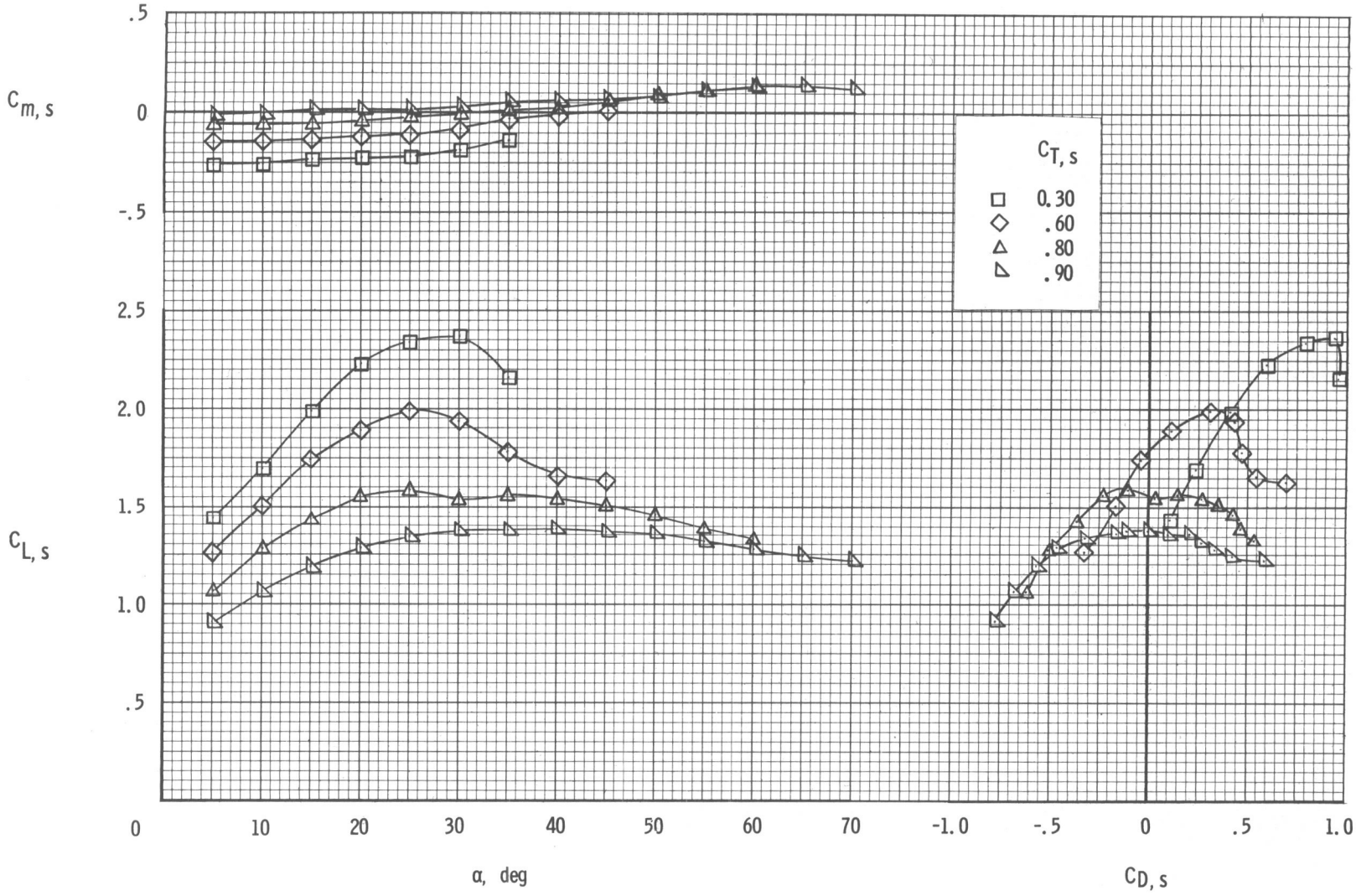
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 32.- Continued.



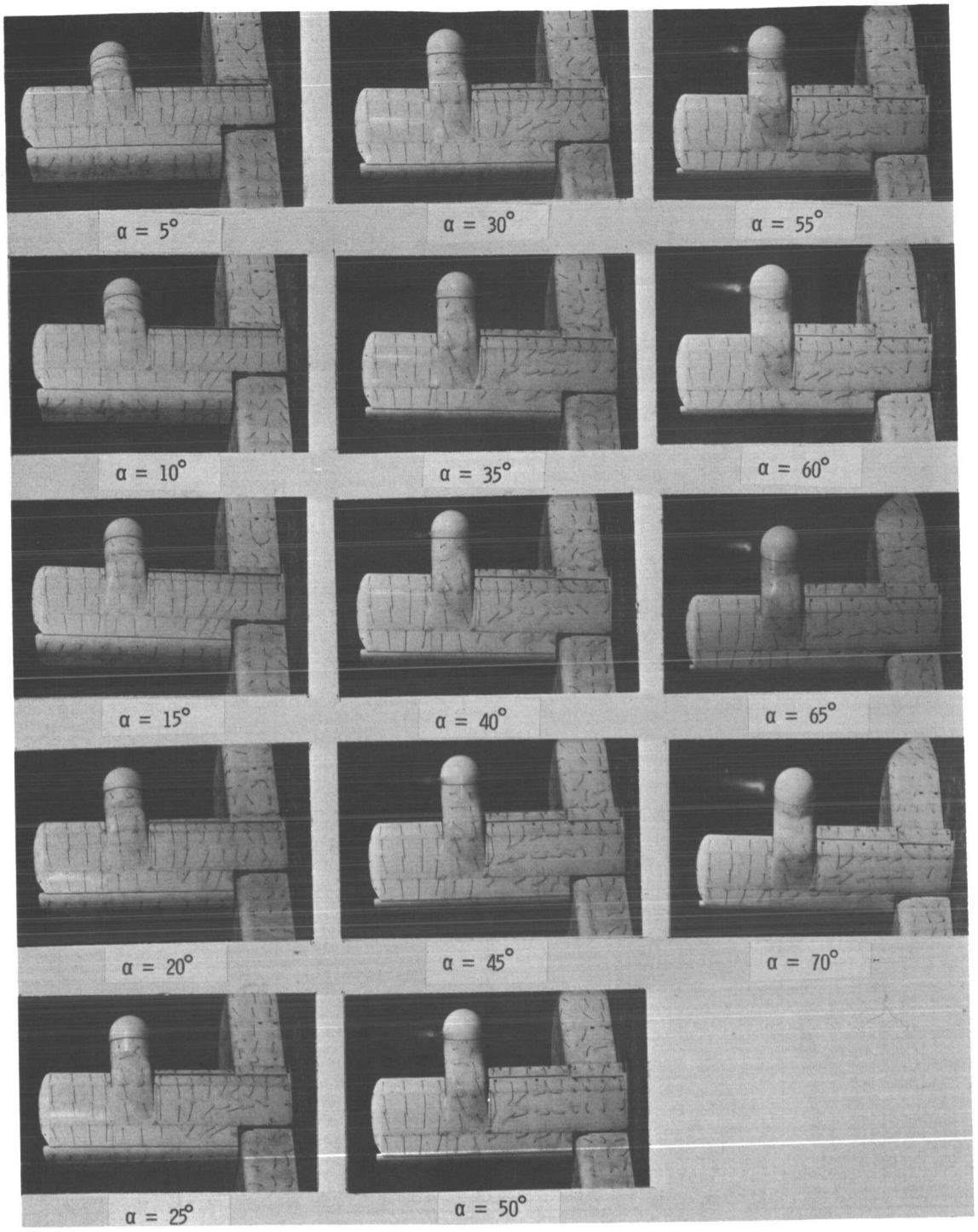
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 32.- Concluded.



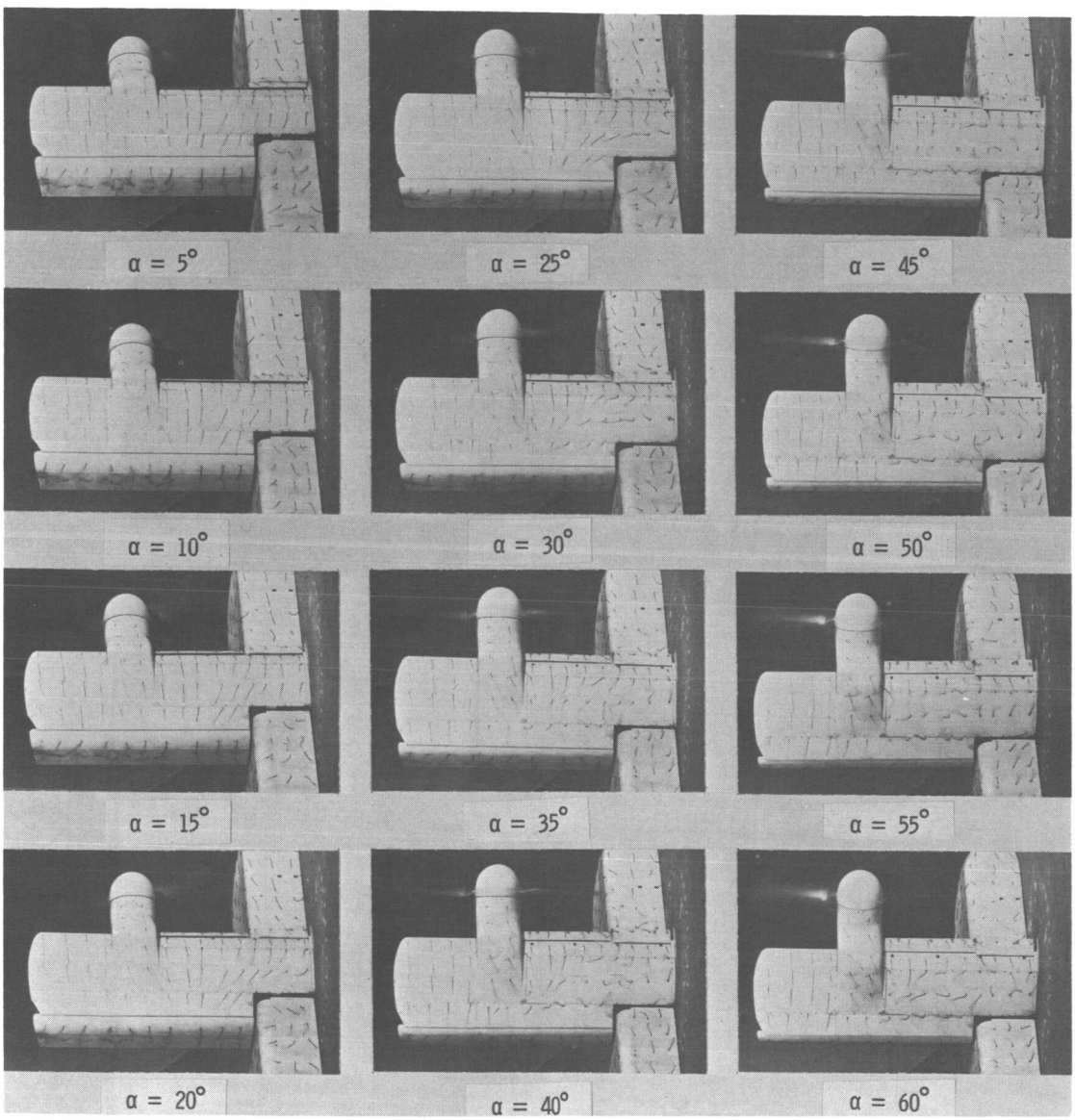
(a) Aerodynamic characteristics.

Figure 33.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, inboard slat on, and $\delta_f = 60^o$.



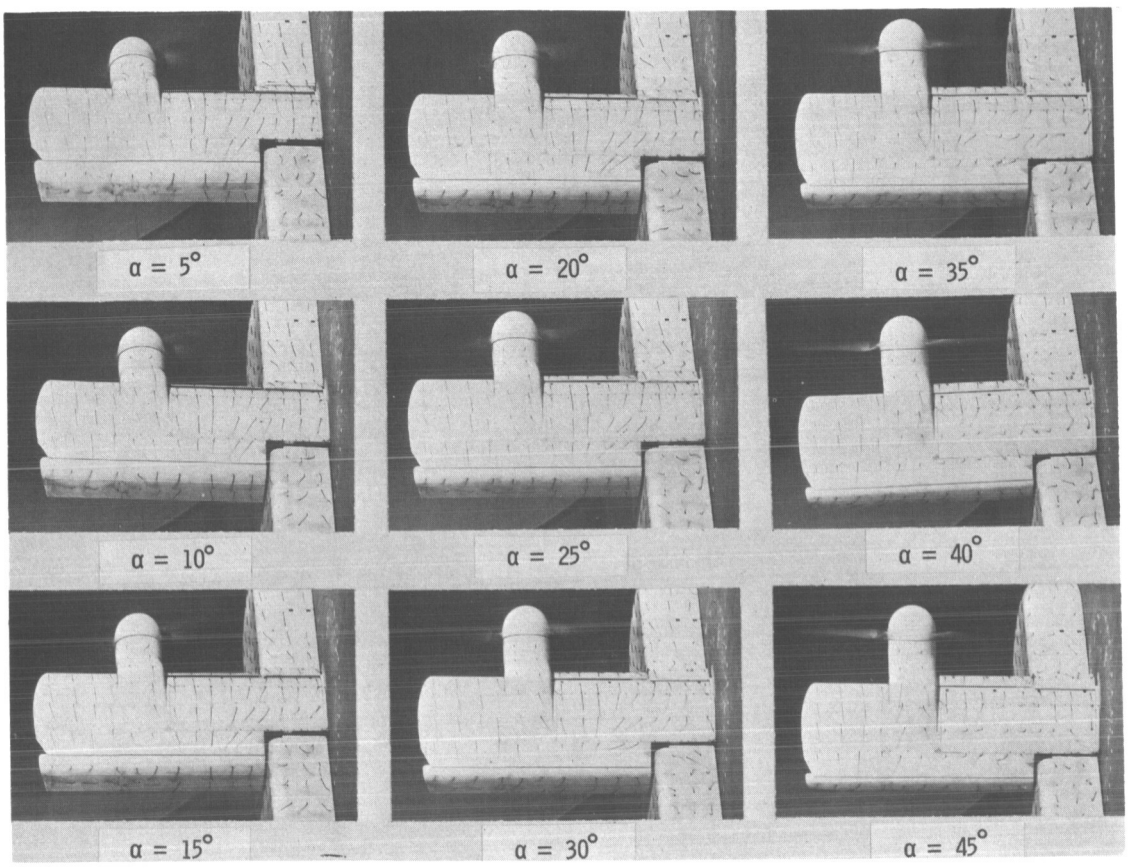
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 33.- Continued.



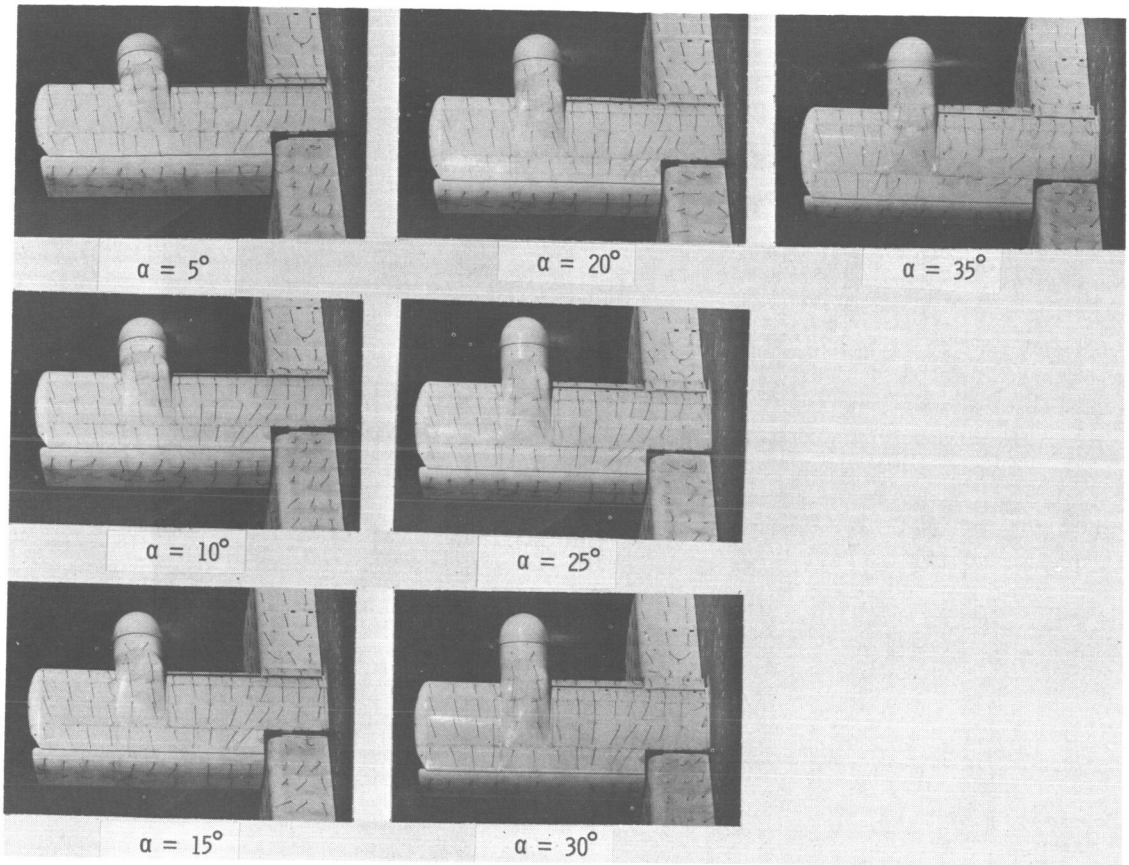
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 33.- Continued.



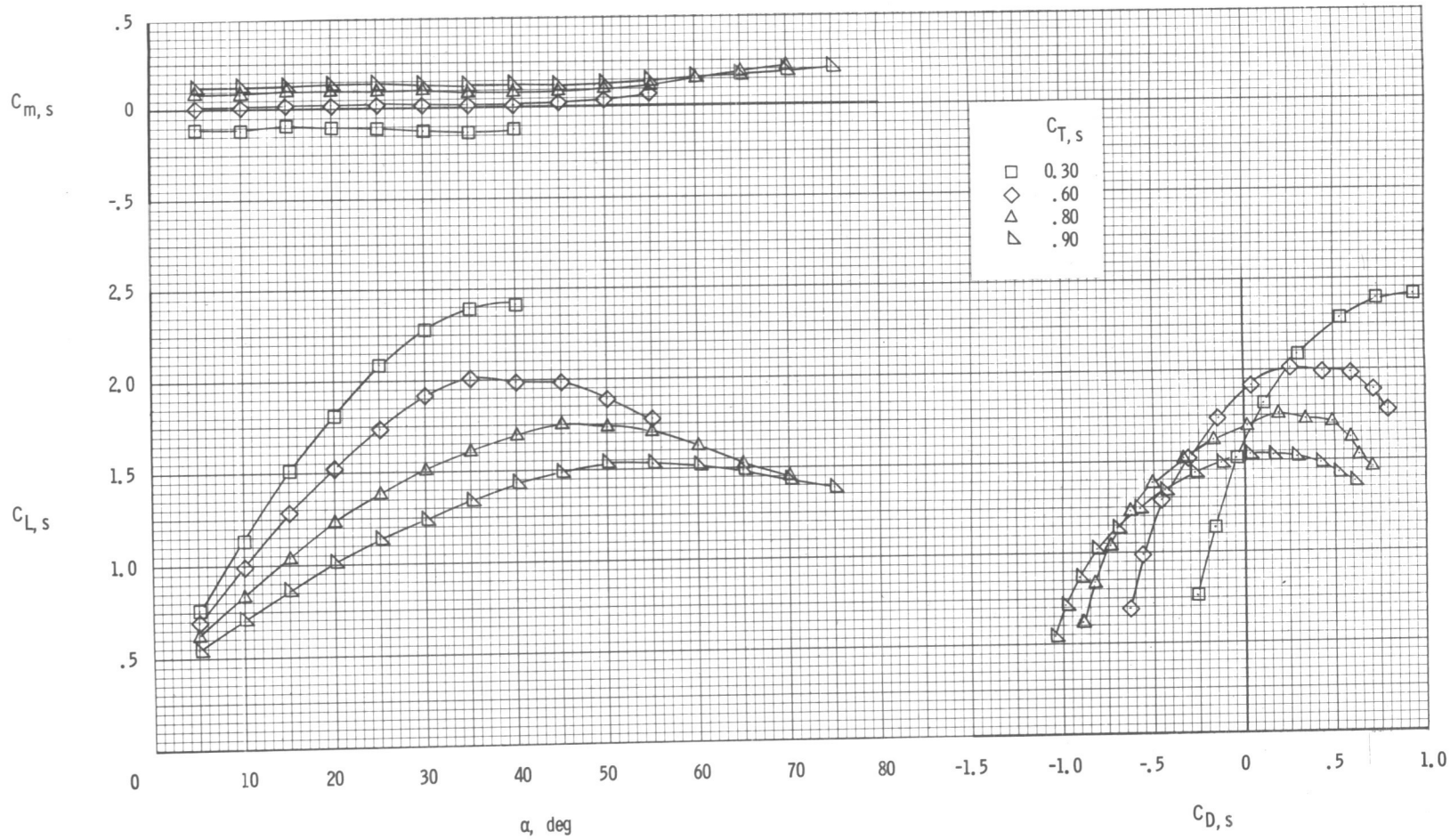
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 33.- Continued.



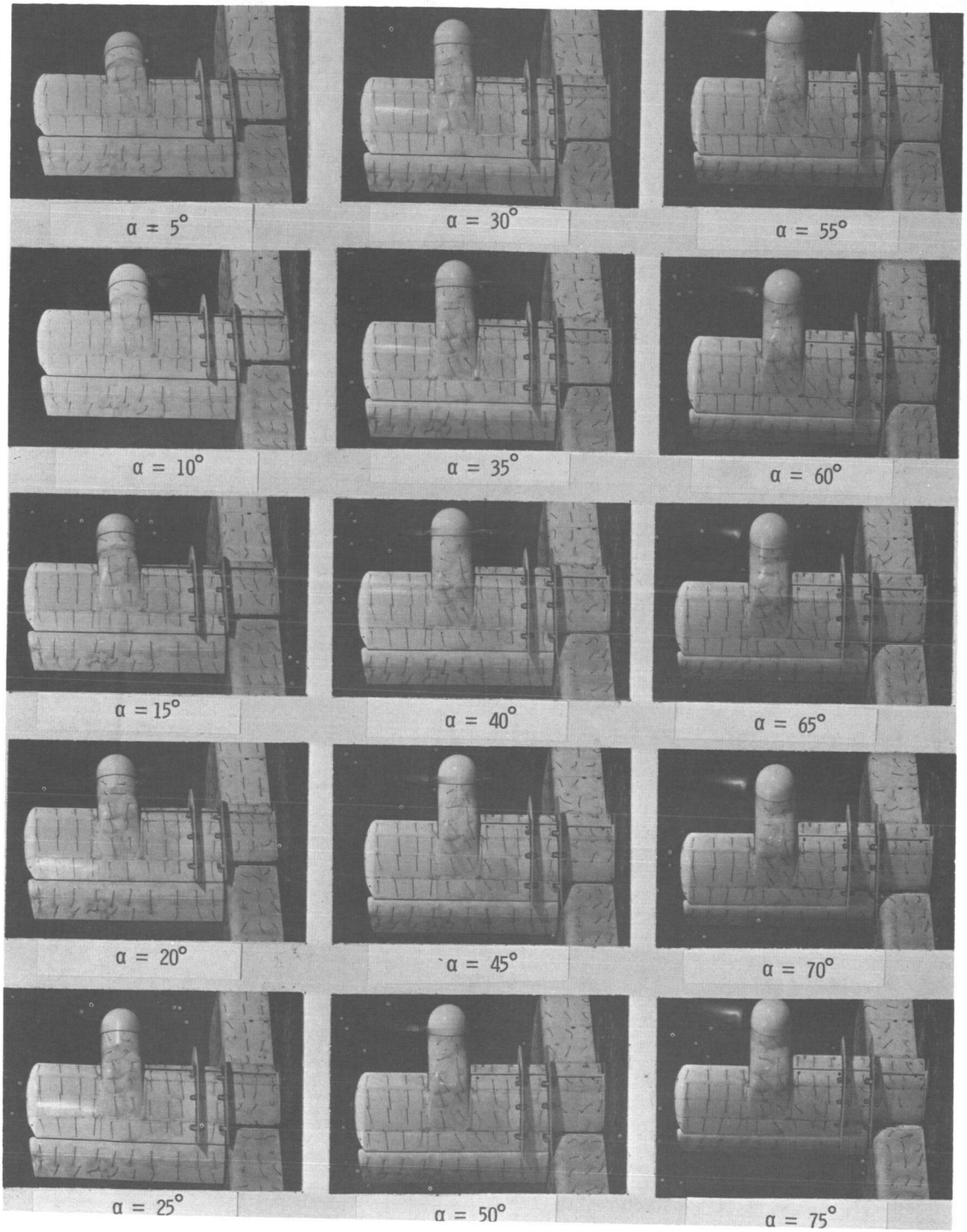
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 33.- Concluded.



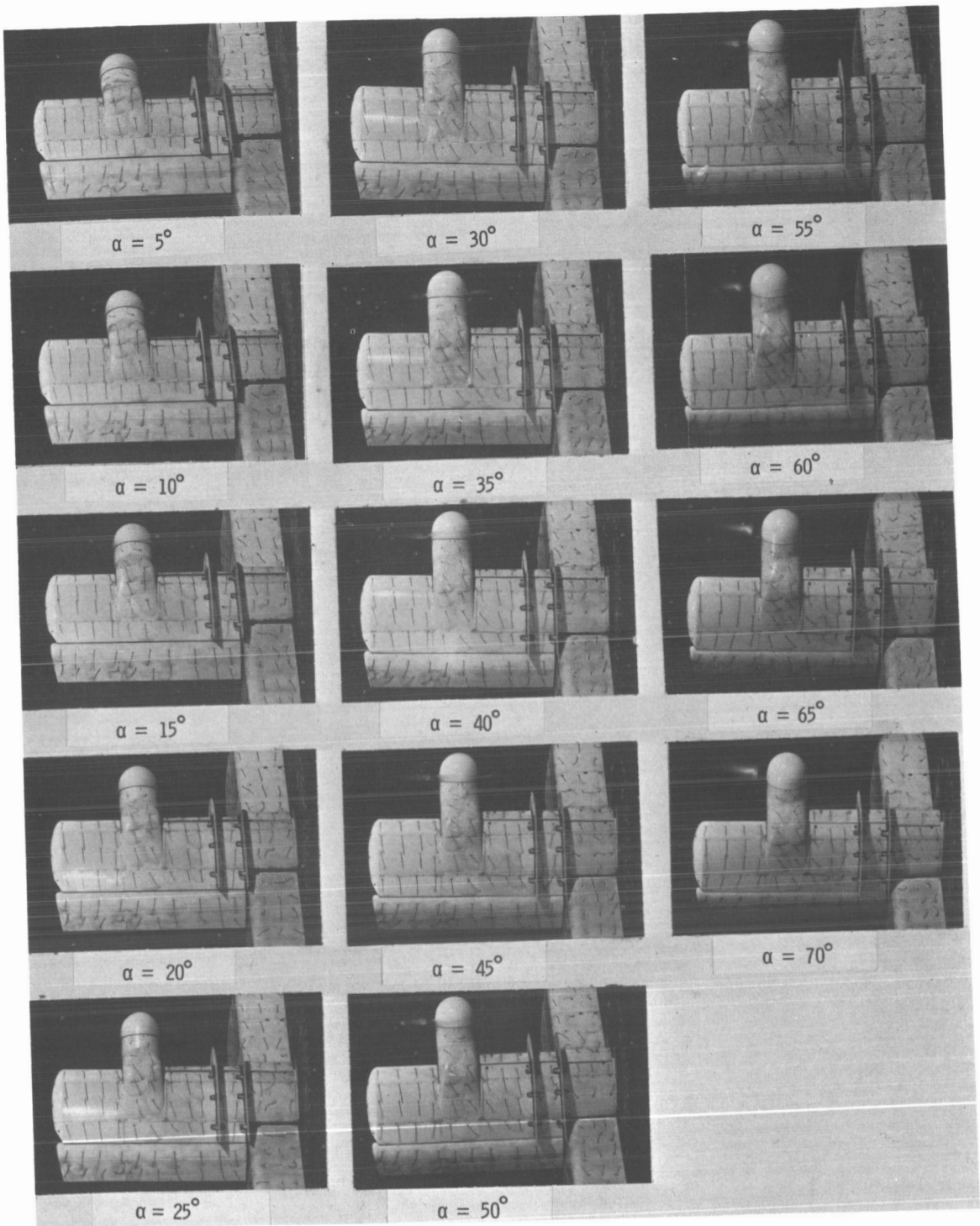
(a) Aerodynamic characteristics.

Figure 34.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, inboard slat on, fences on, and $\delta_f = 20^o$.



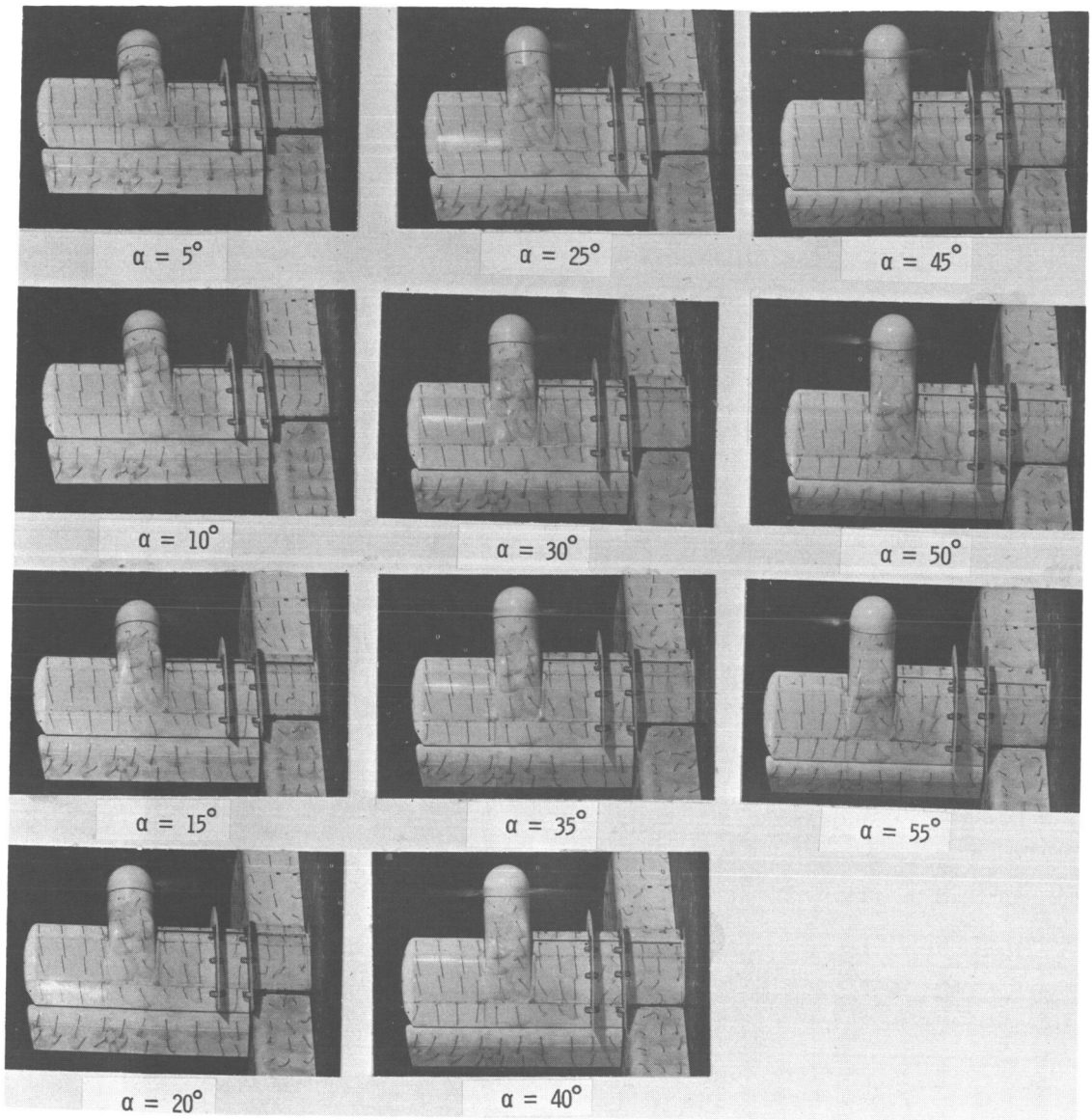
(b) Flow characteristics; $C_{T,s} = 0.90$.

Figure 34.- Continued.



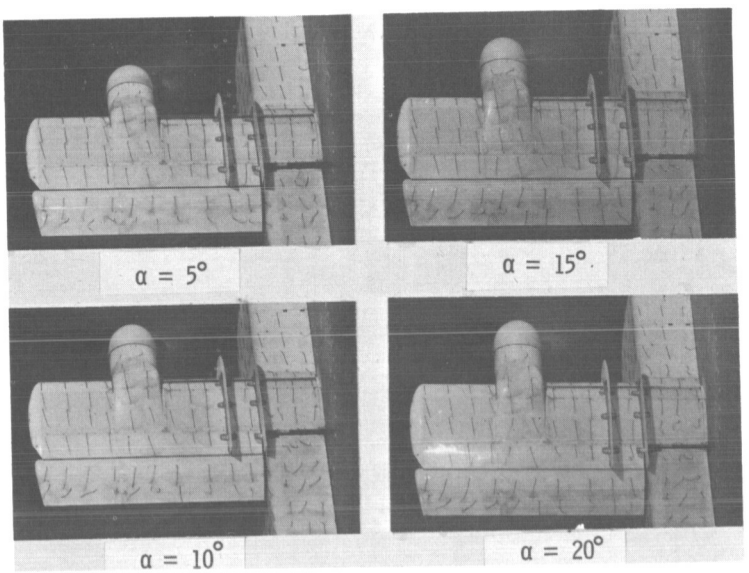
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 34.- Continued.



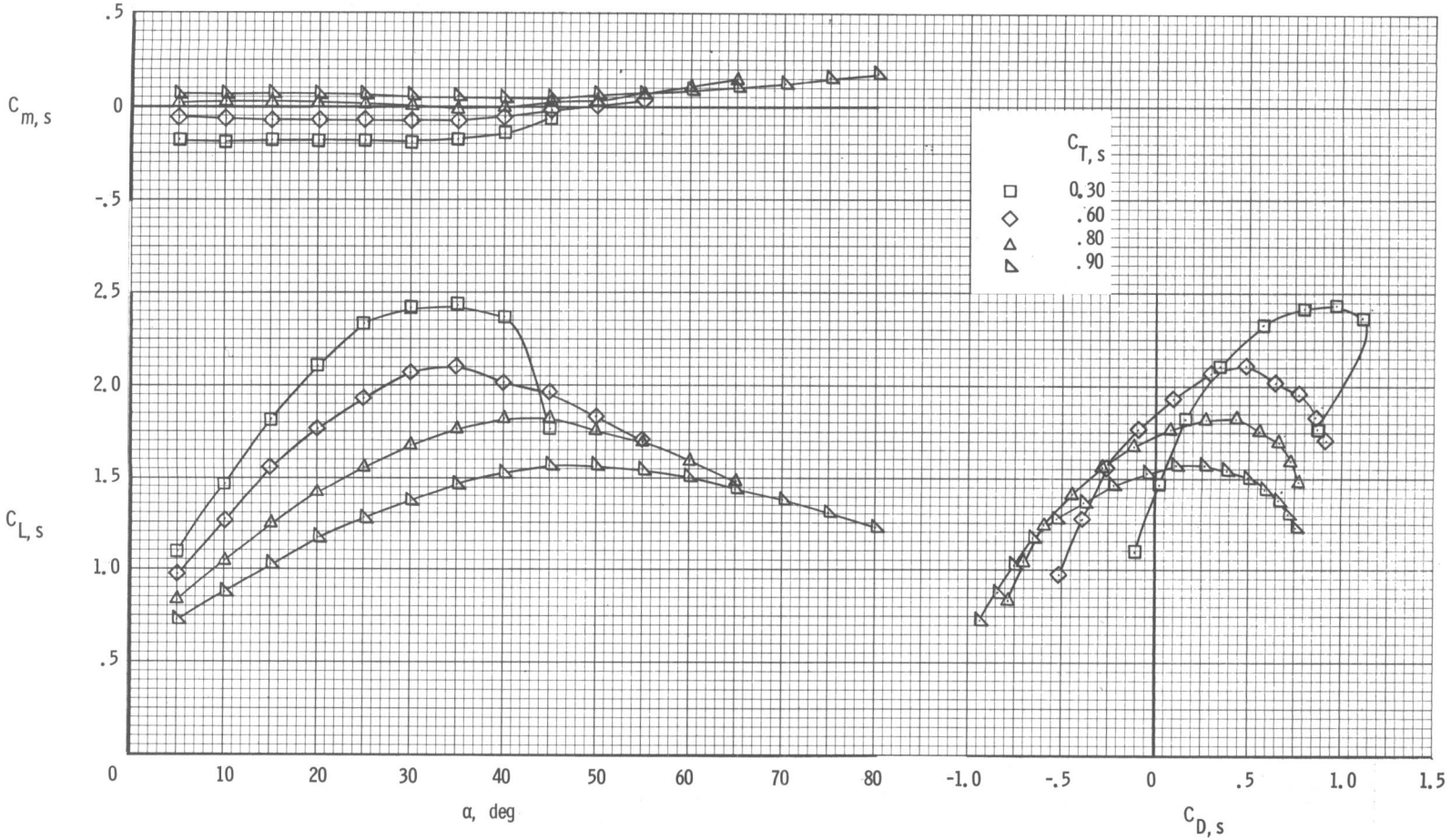
(d) Flow characteristics; $C_{T,s} = 0.60$.

Figure 34.- Continued.



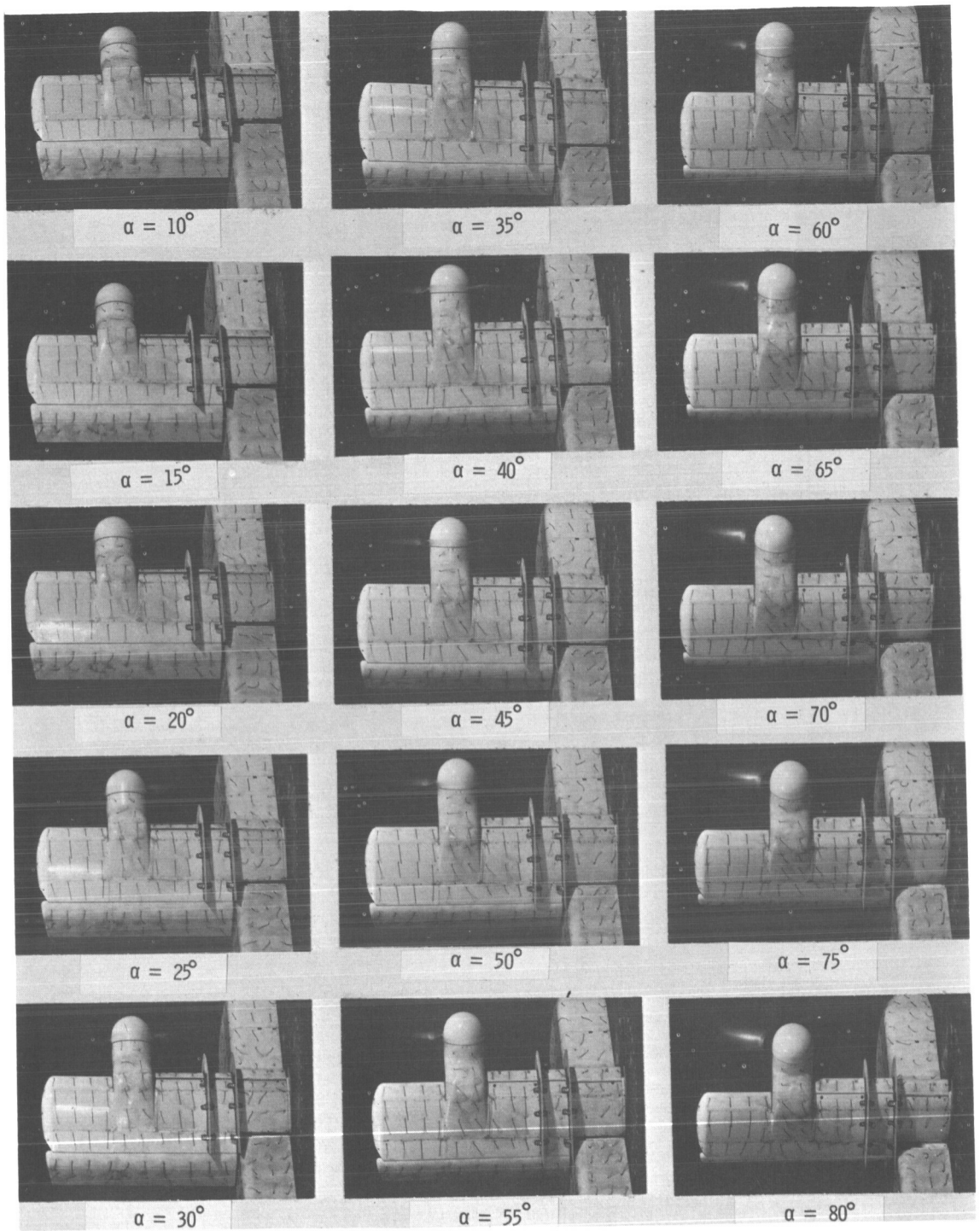
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 34.- Concluded.



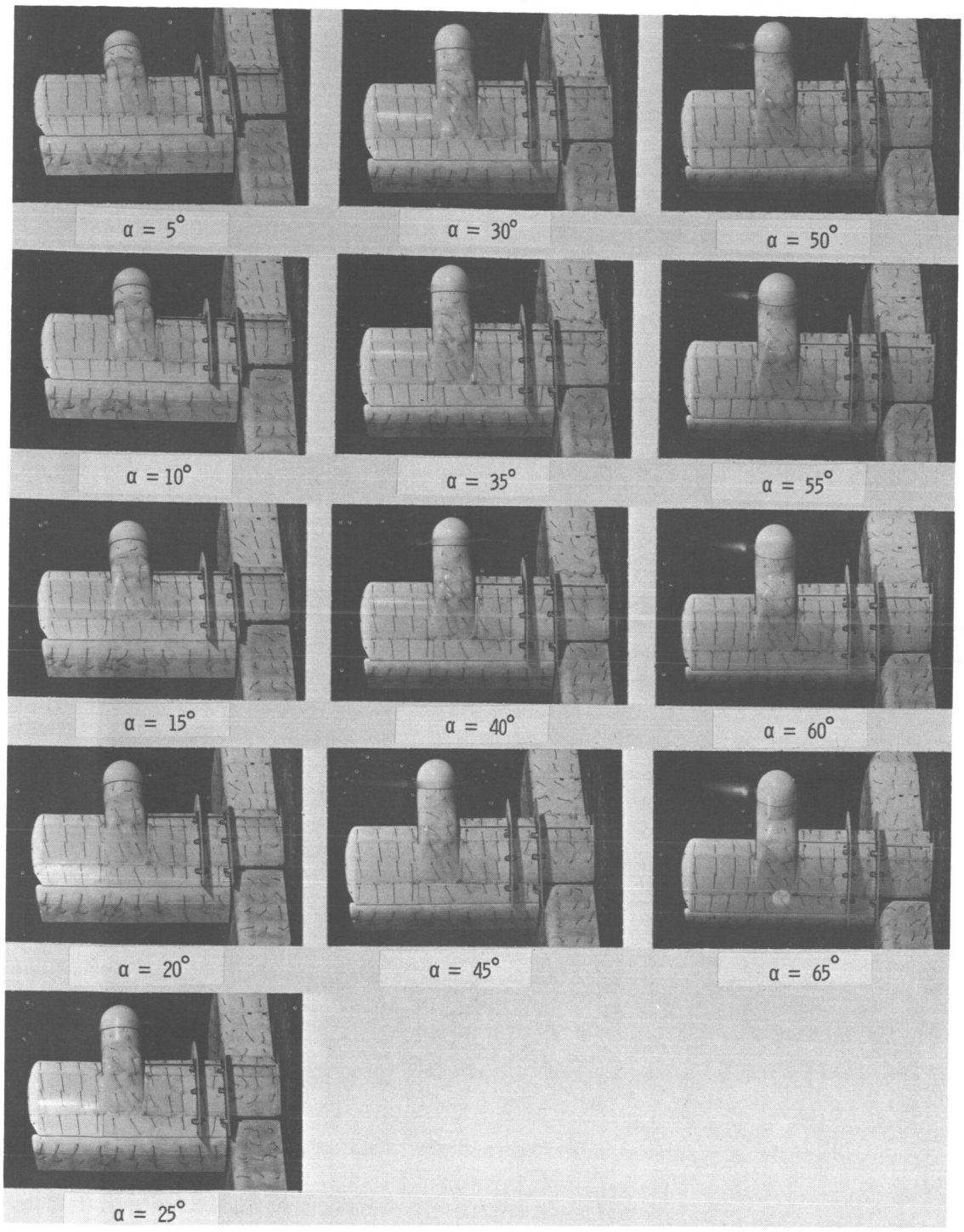
(a) Aerodynamic characteristics.

Figure 35.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, inboard slat on, fences on, and $\delta_f = 40^o$.



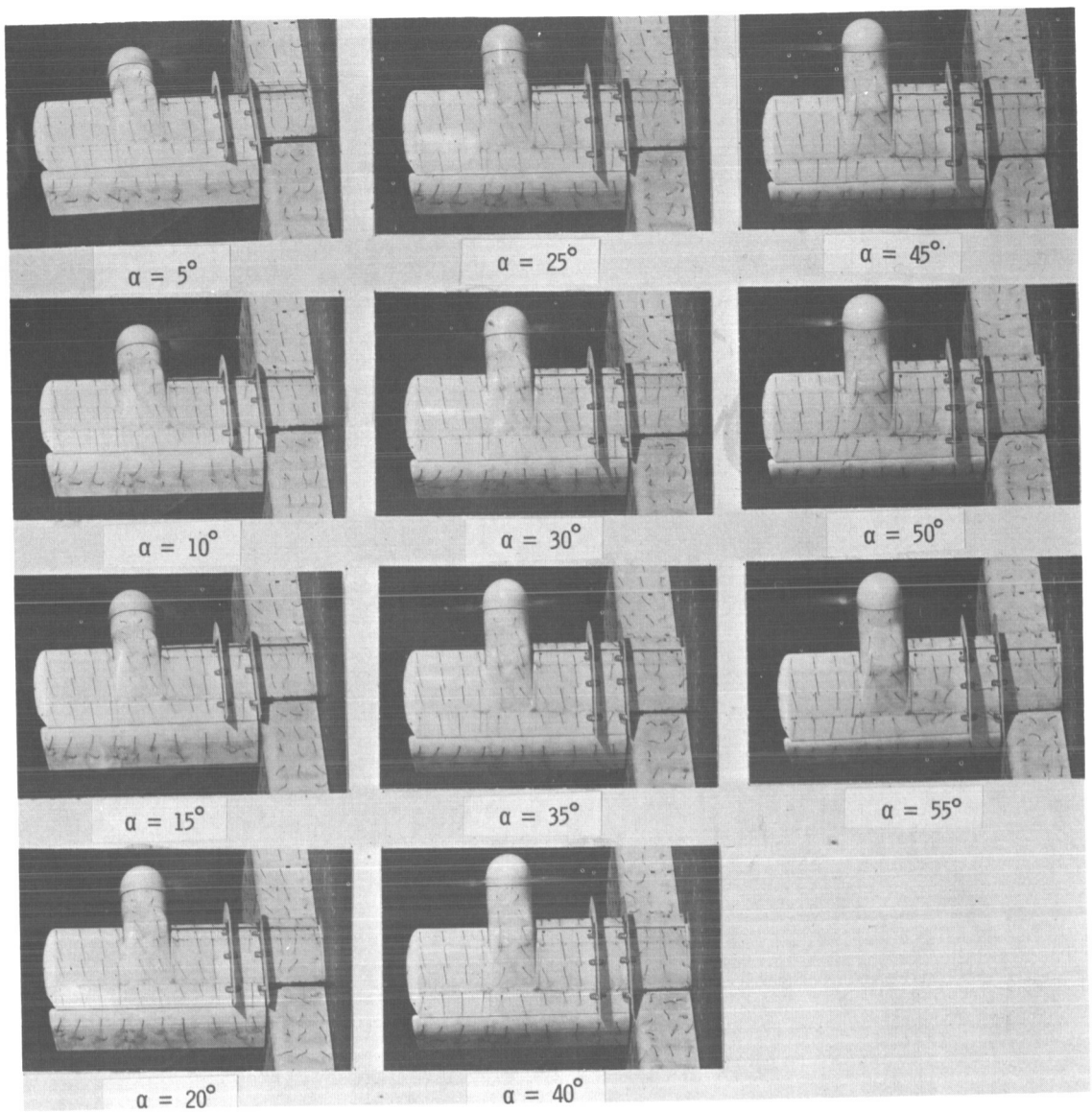
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 35.- Continued.



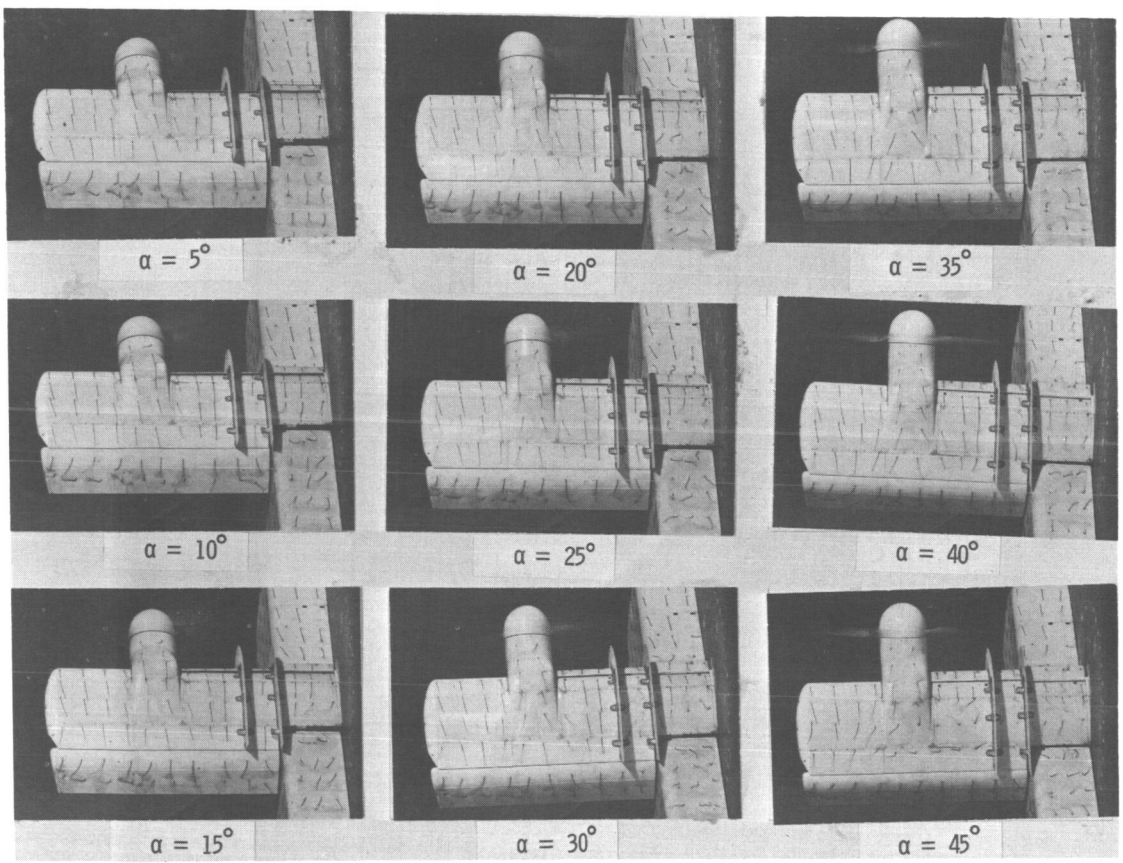
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 35.- Continued.



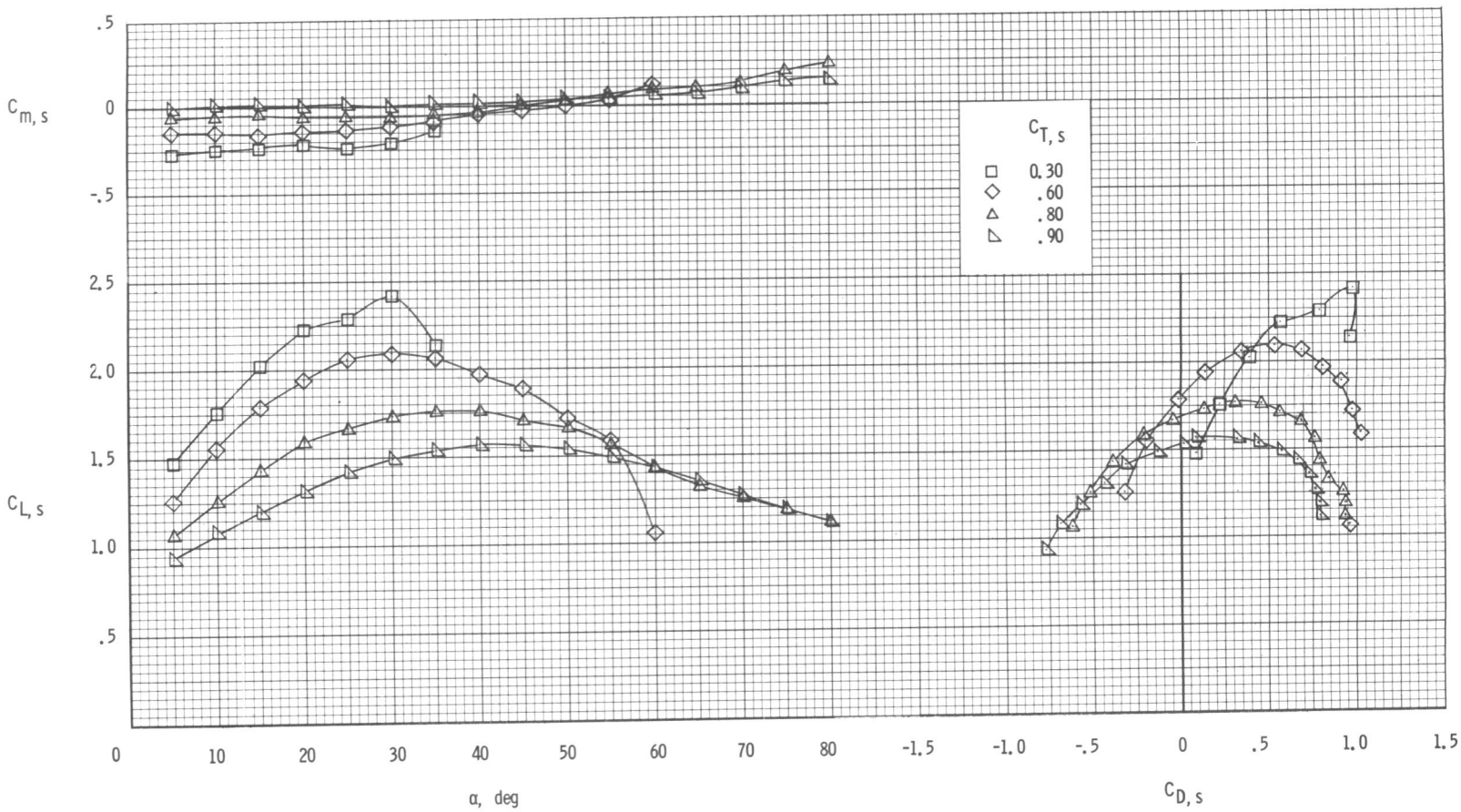
(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 35.- Continued.



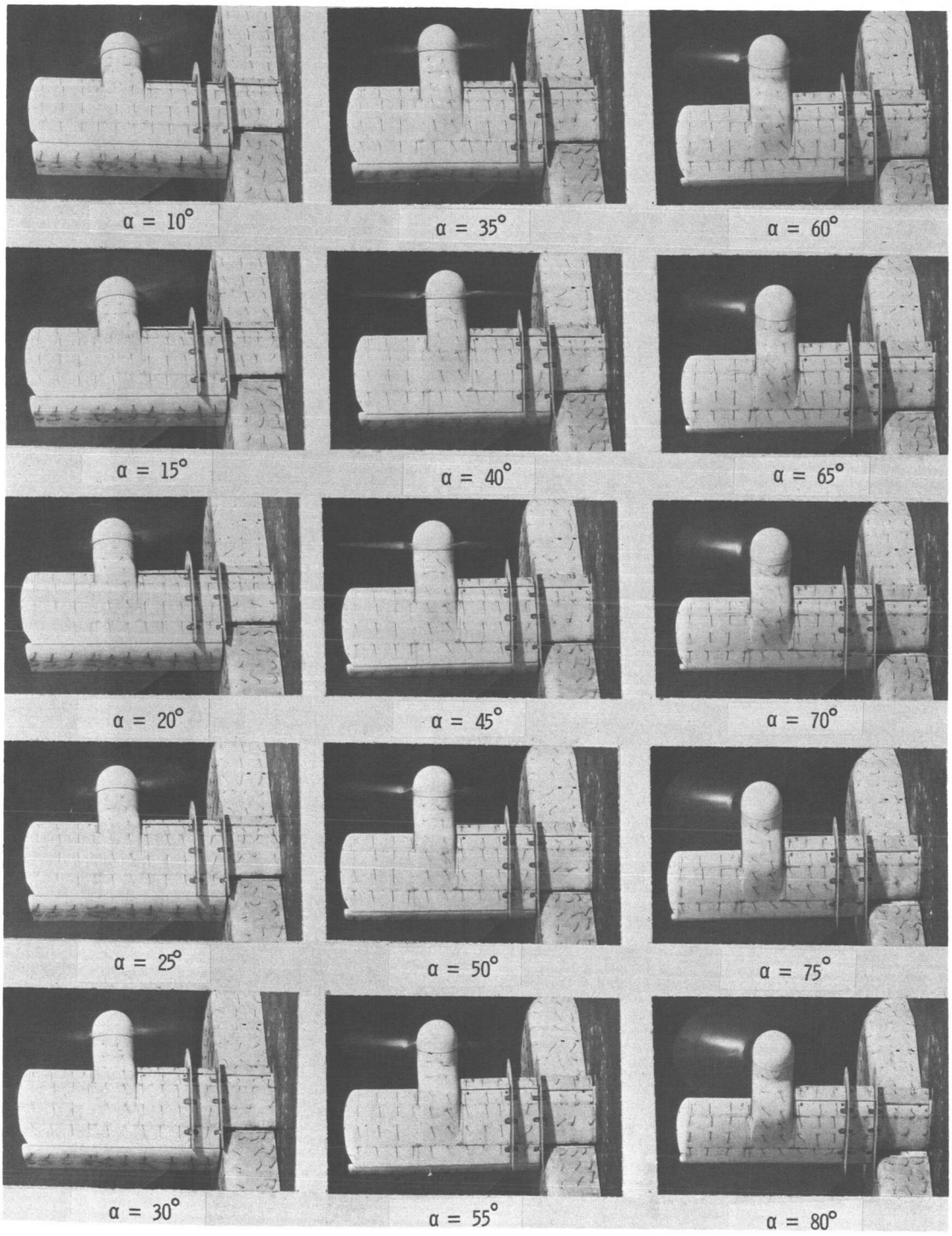
(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 35.- Concluded.



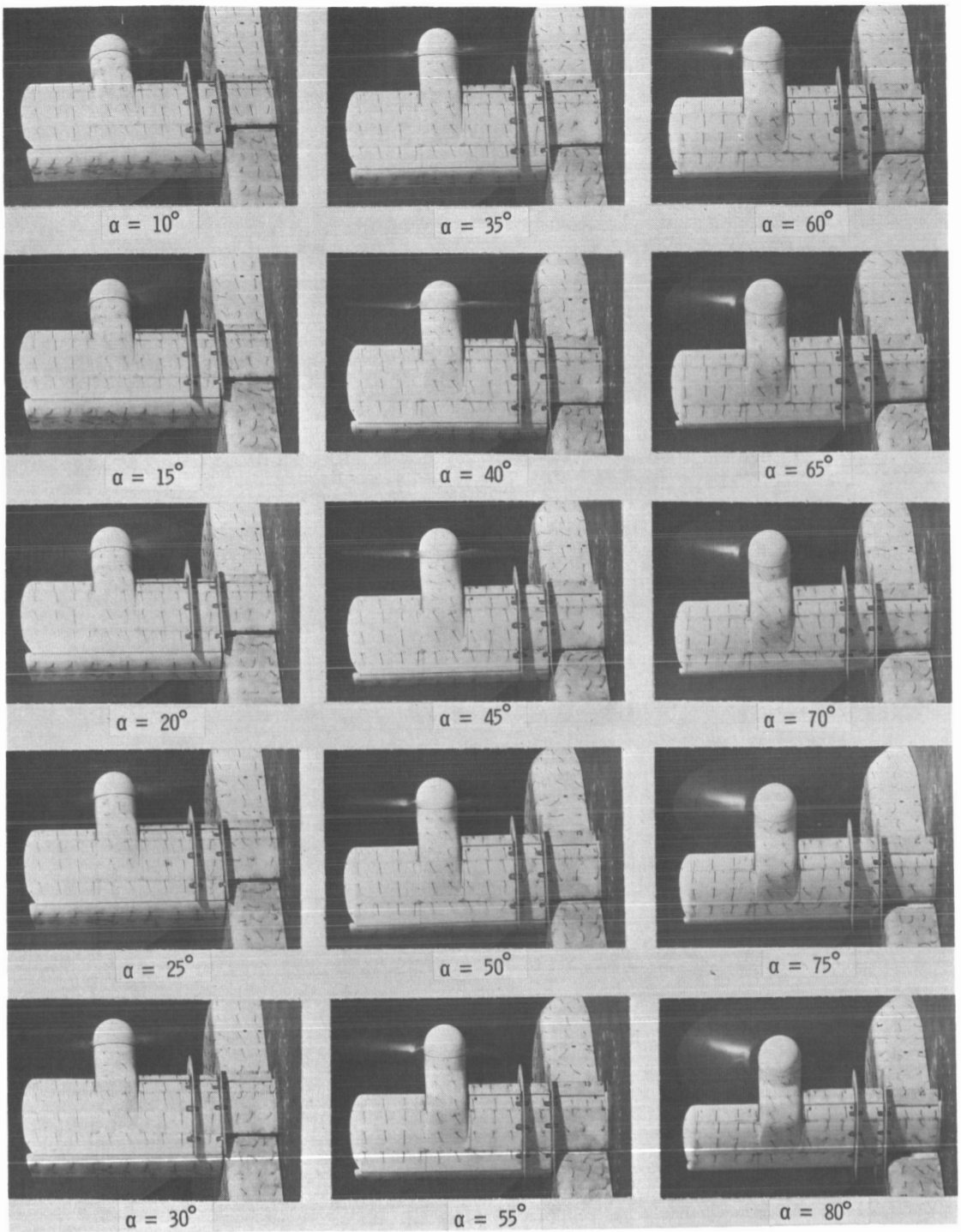
(a) Aerodynamic characteristics.

Figure 36.- Aerodynamic and flow characteristics of the wing with the propeller rotating down at the tip, inboard slat on, fences on, and $\delta_f = 60^0$.



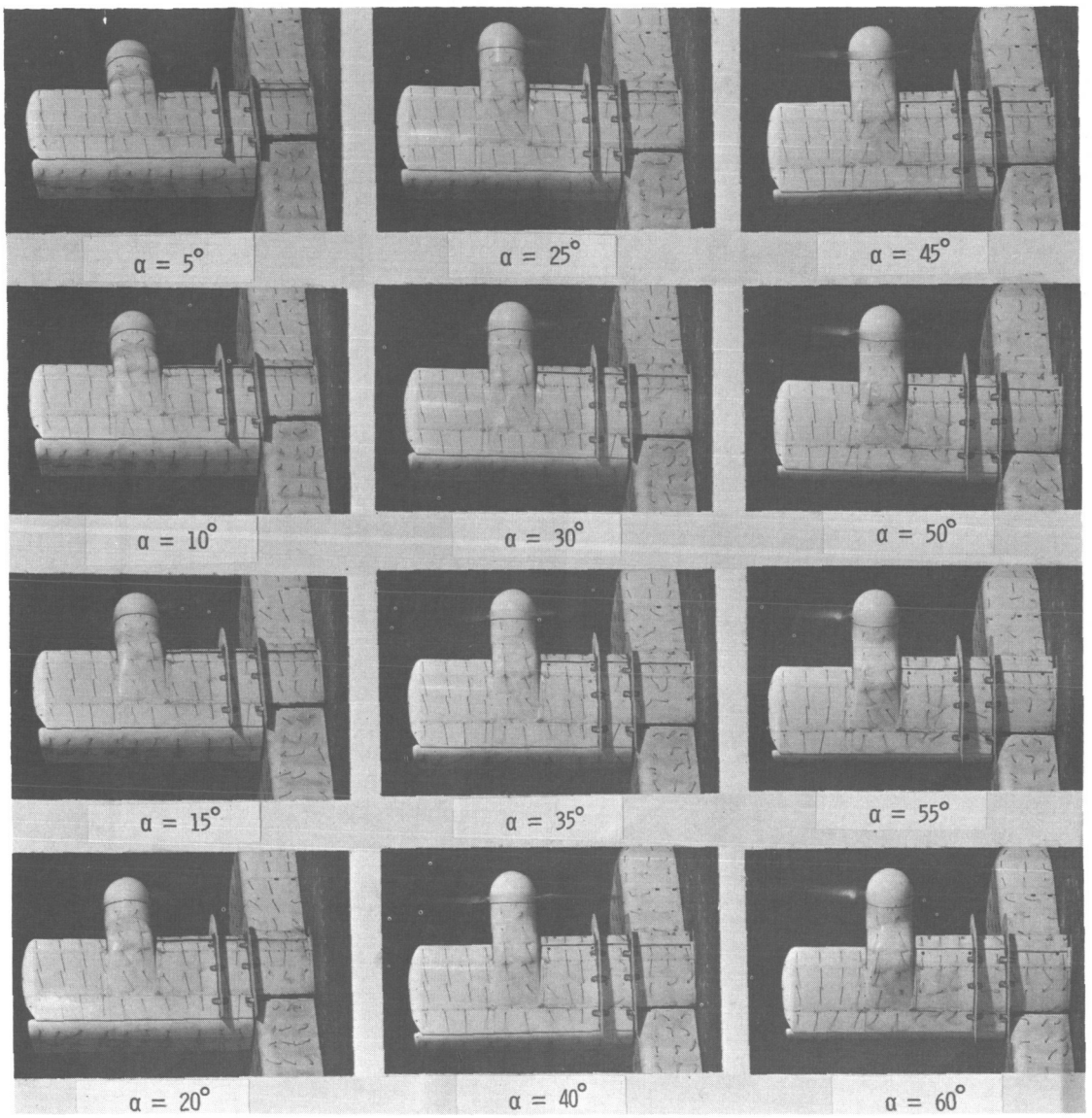
(b) Flow characteristics; $C_{T,S} = 0.90$.

Figure 36.- Continued.



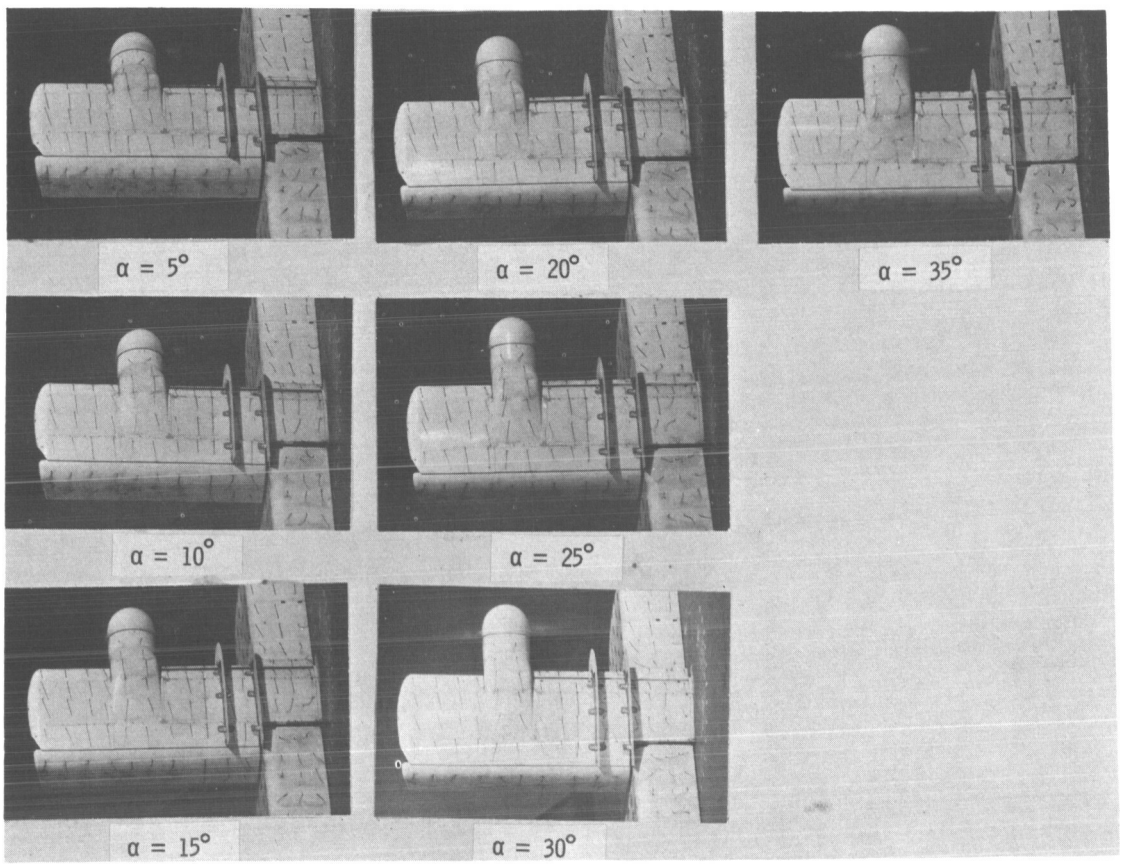
(c) Flow characteristics; $C_{T,S} = 0.80$.

Figure 36.- Continued.



(d) Flow characteristics; $C_{T,S} = 0.60$.

Figure 36.- Continued.



(e) Flow characteristics; $C_{T,S} = 0.30$.

Figure 36.- Concluded.

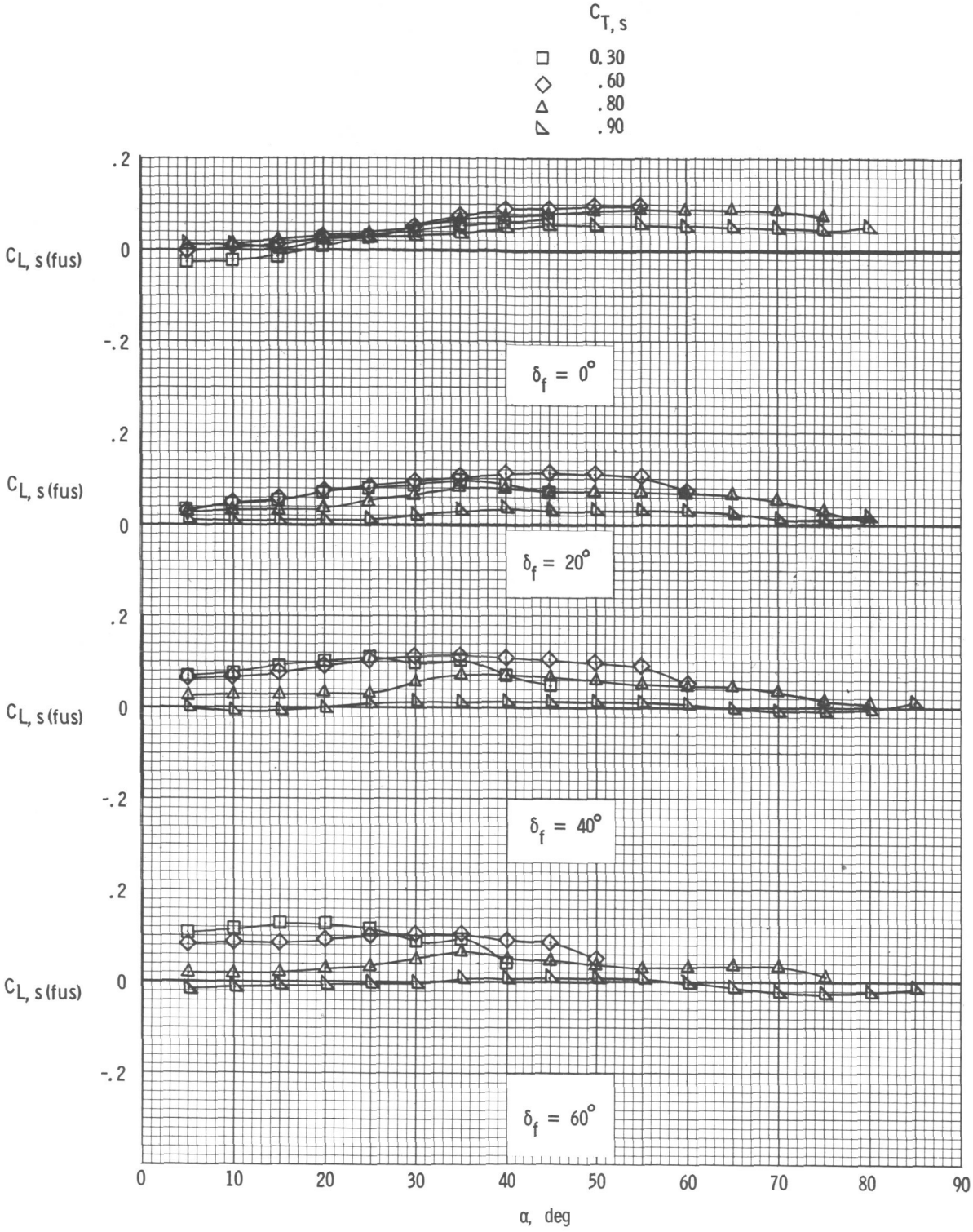


Figure 37.- Fuselage lift coefficient for up-at-the-tip rotation and basic leading edge.

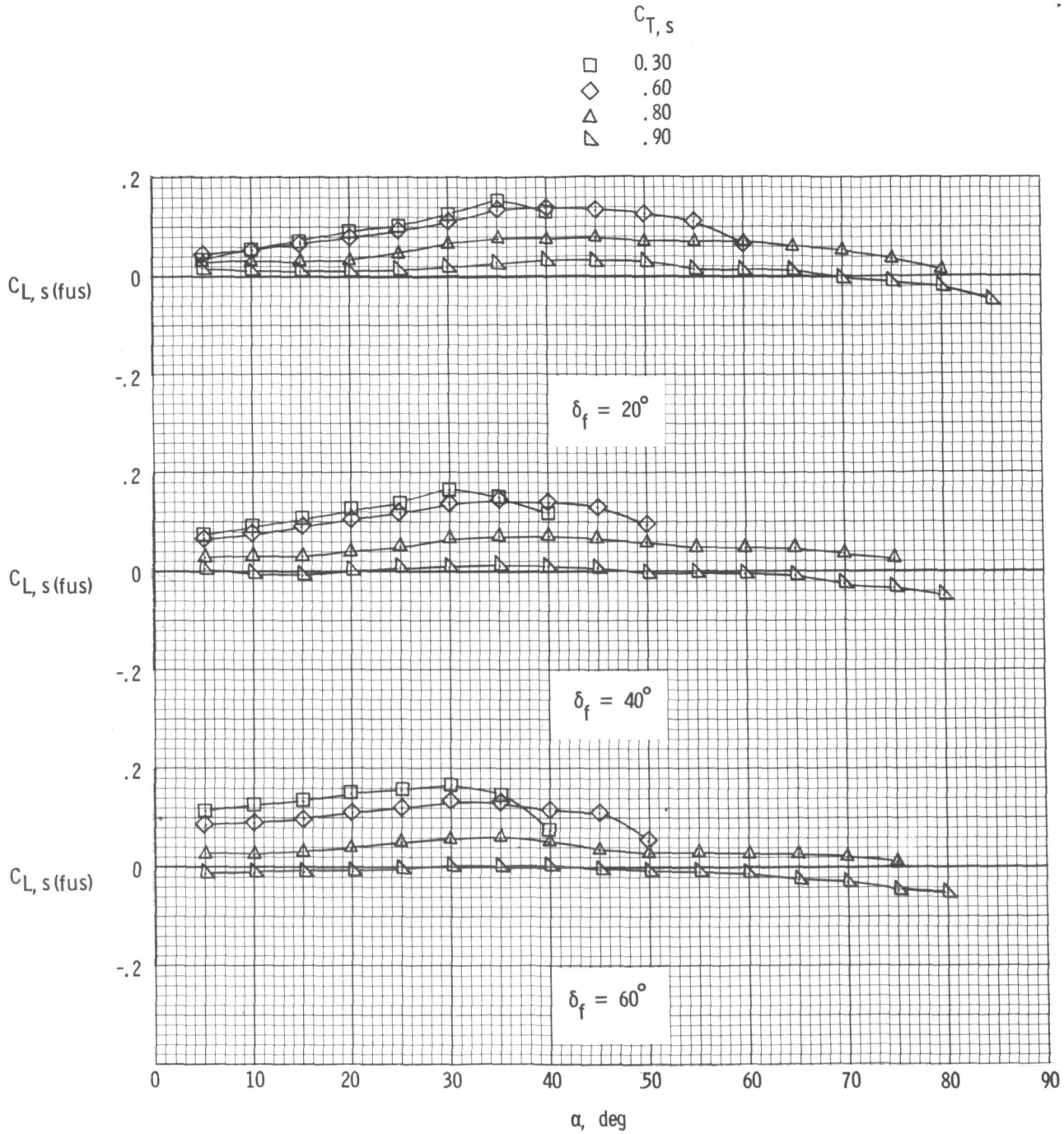


Figure 38.- Fuselage lift coefficient for up-at-the-tip rotation, basic leading edge, and fences on.

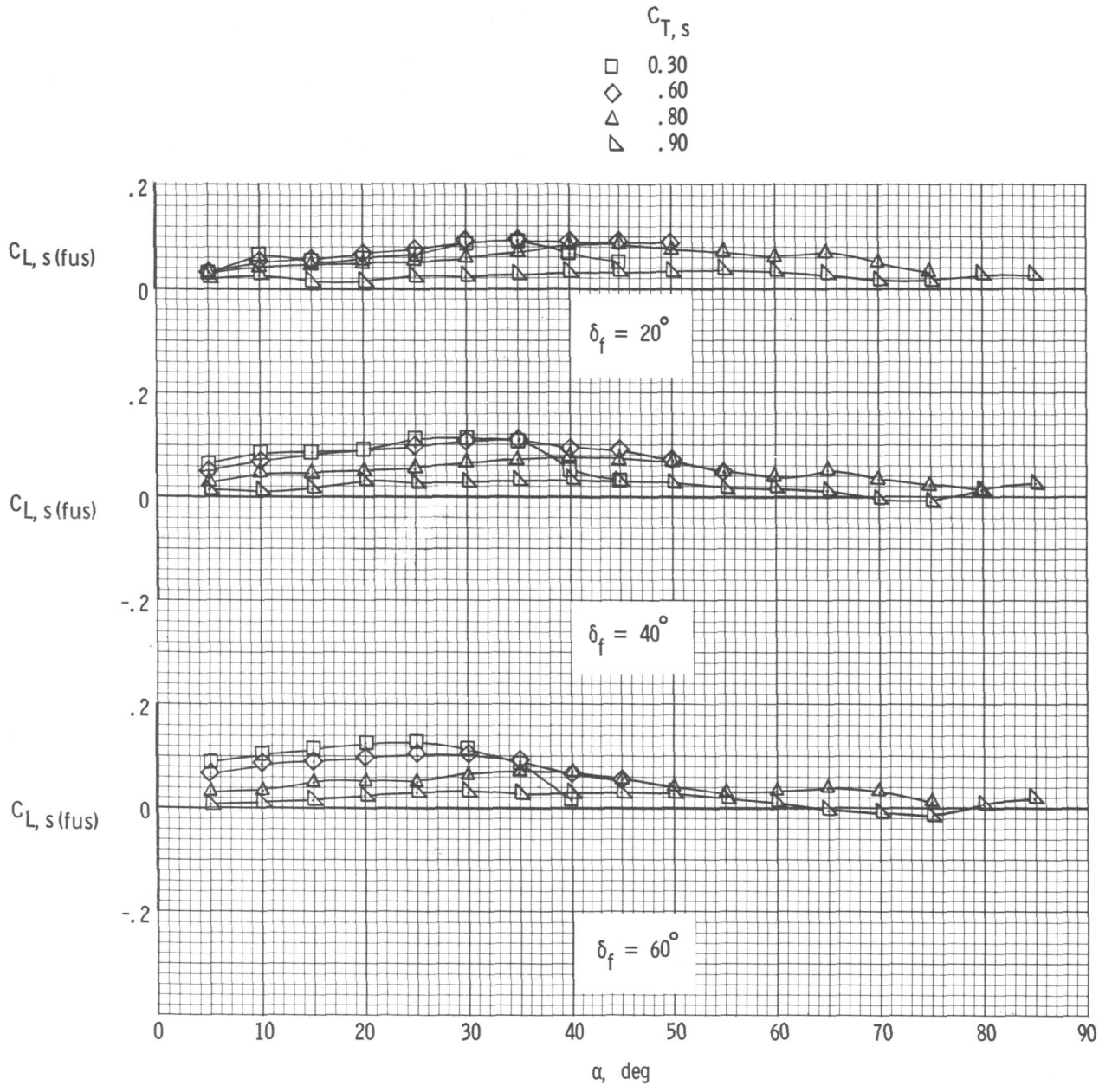


Figure 39.- Fuselage lift coefficient for up-at-the-tip rotation and inboard slat on.

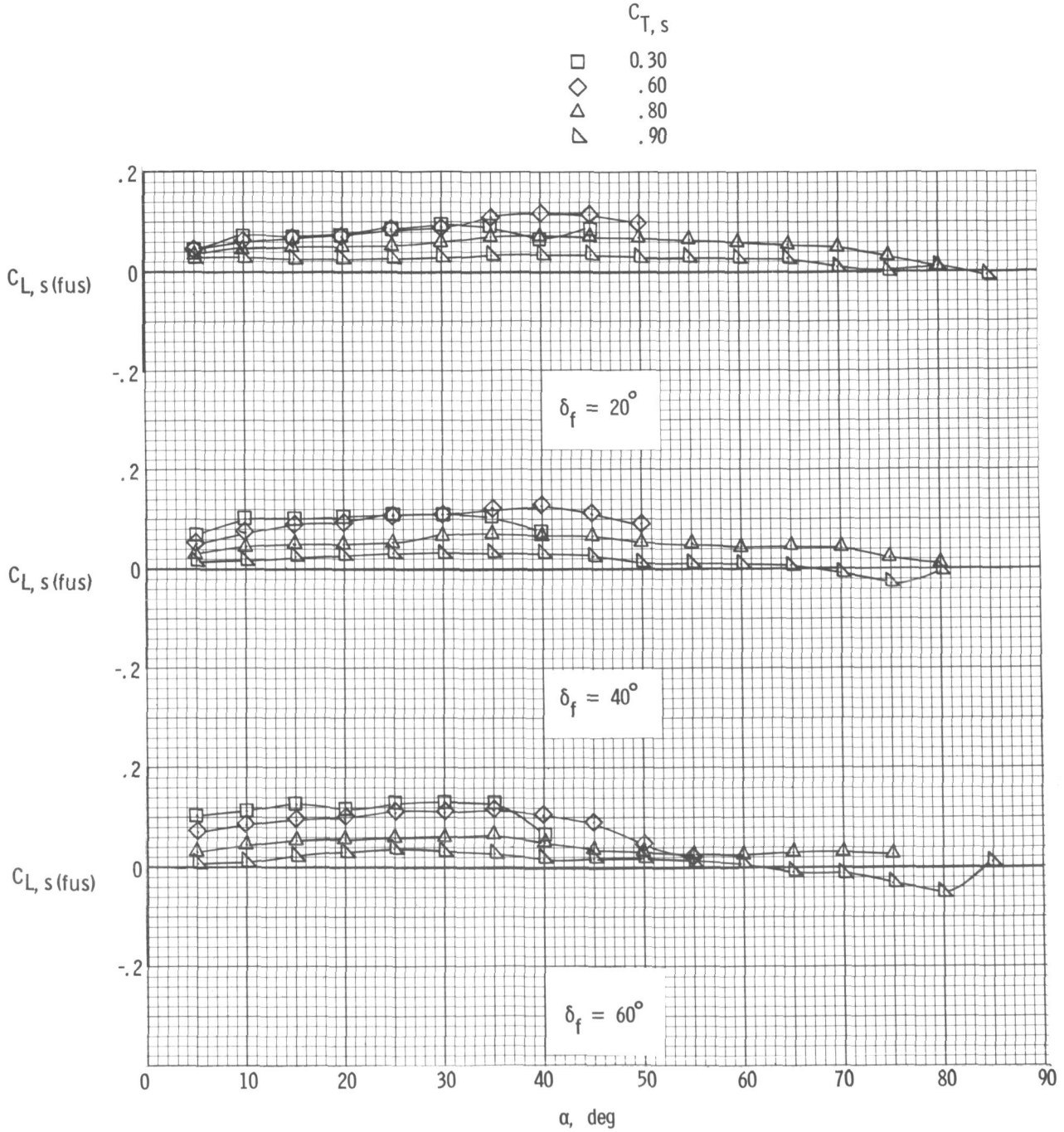


Figure 40.- Fuselage lift coefficient for up-at-the-tip rotation, inboard slat on, and fences on.

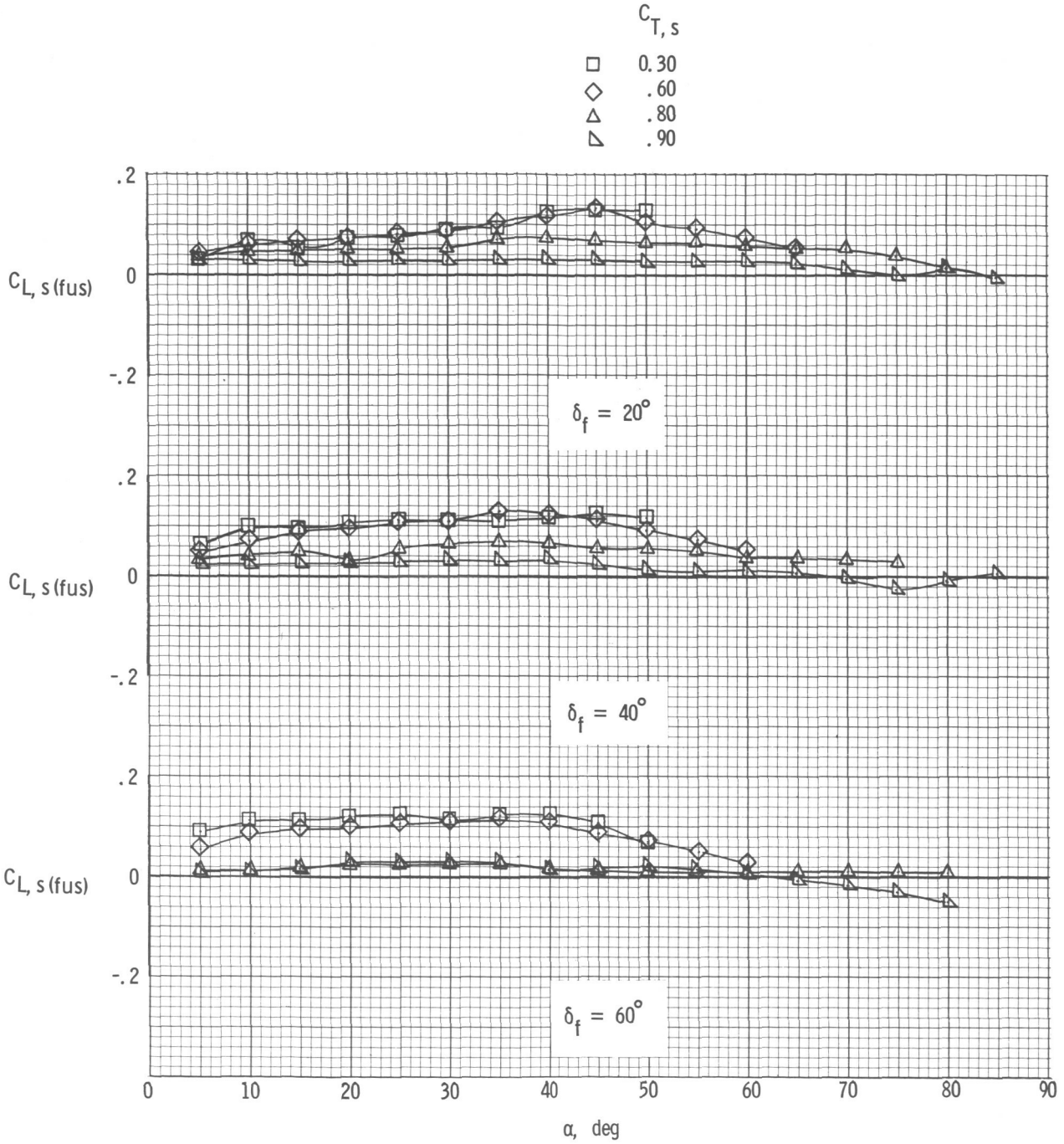


Figure 41.- Fuselage lift coefficient for up-at-the-tip rotation, full-span slat on, and fences on.

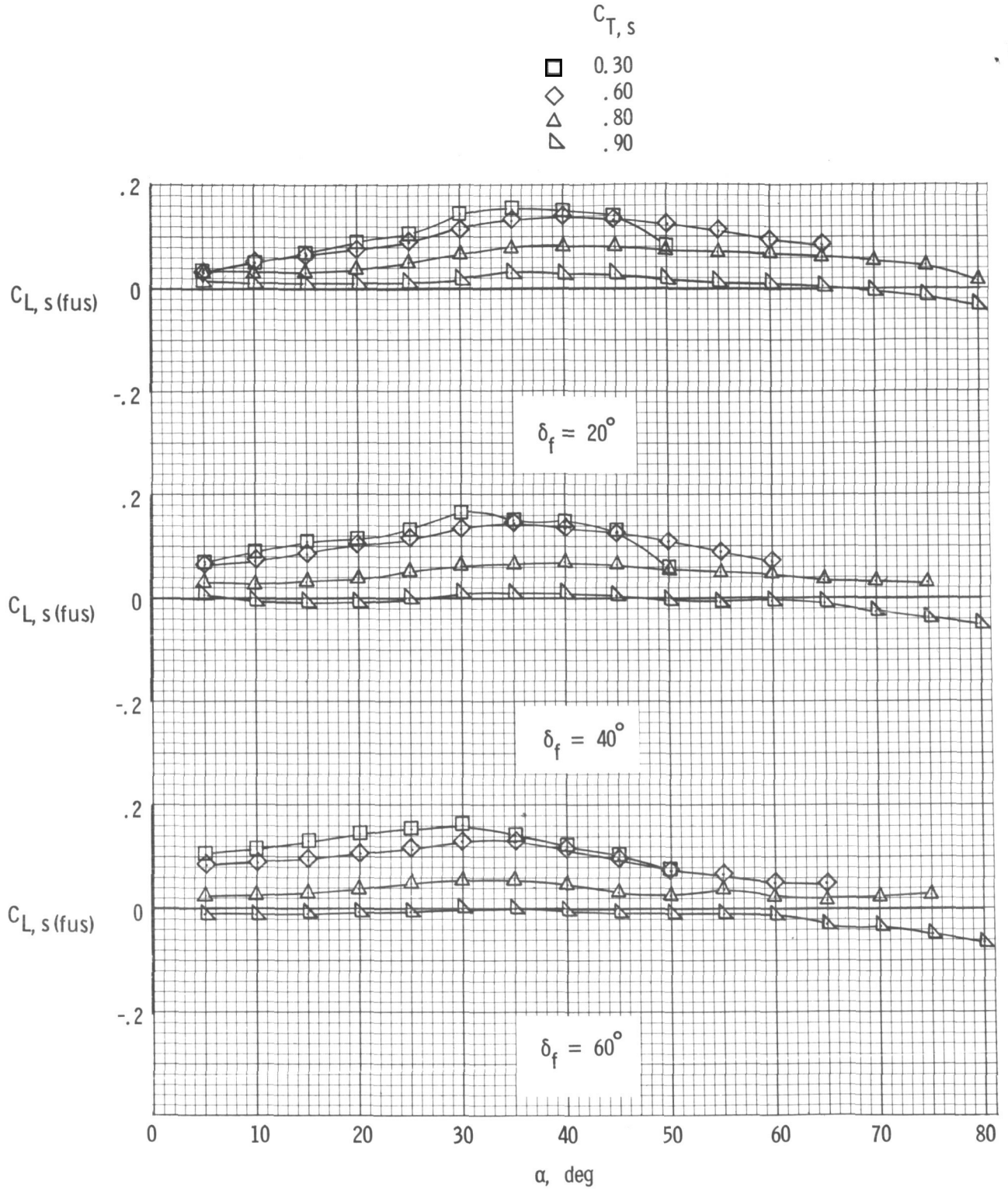


Figure 42.- Fuselage lift coefficient for up-at-the-tip rotation, outboard slat on, and fences on.

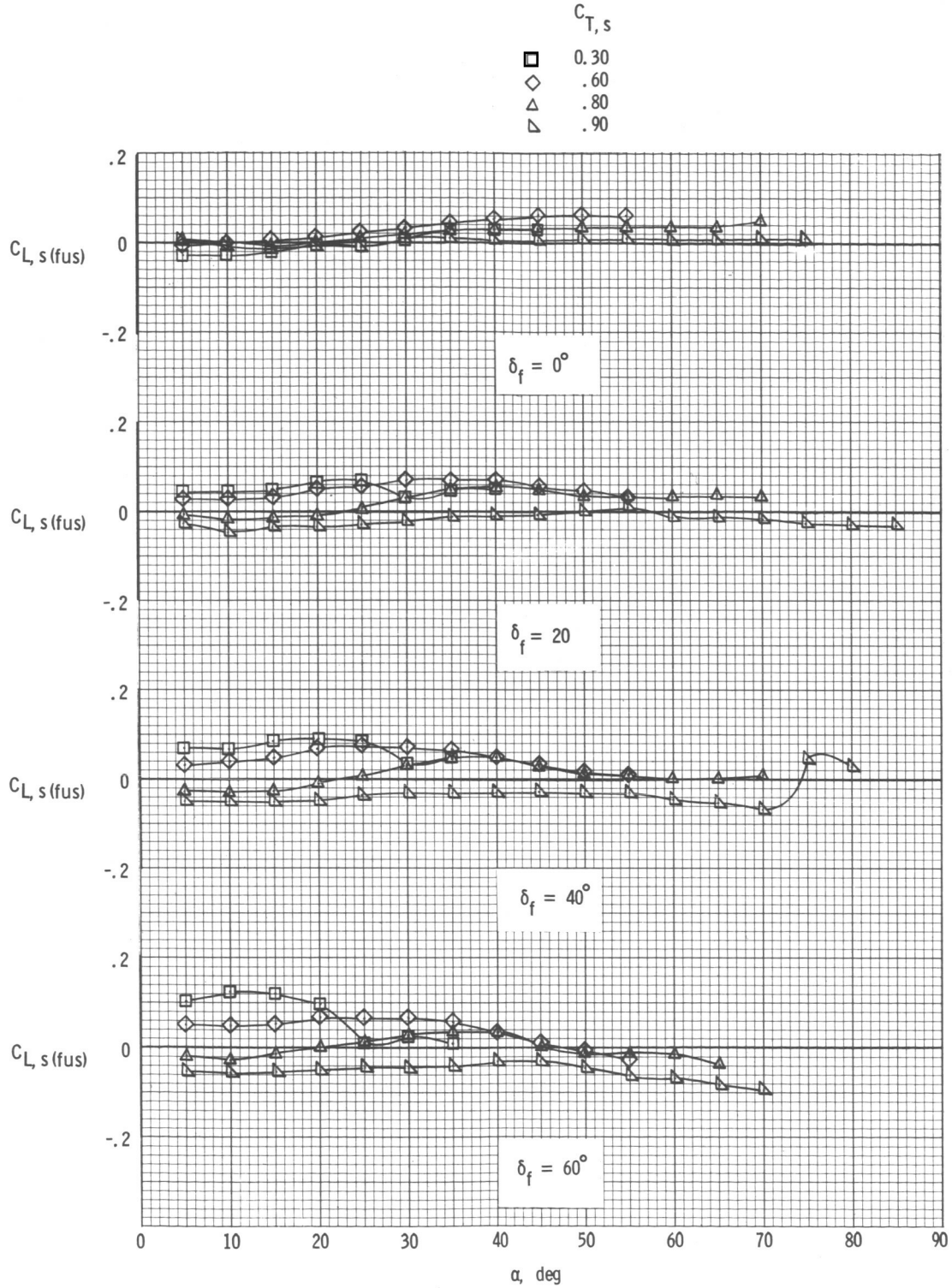


Figure 43.- Fuselage lift coefficient for down-at-the-tip rotation and basic leading edge.

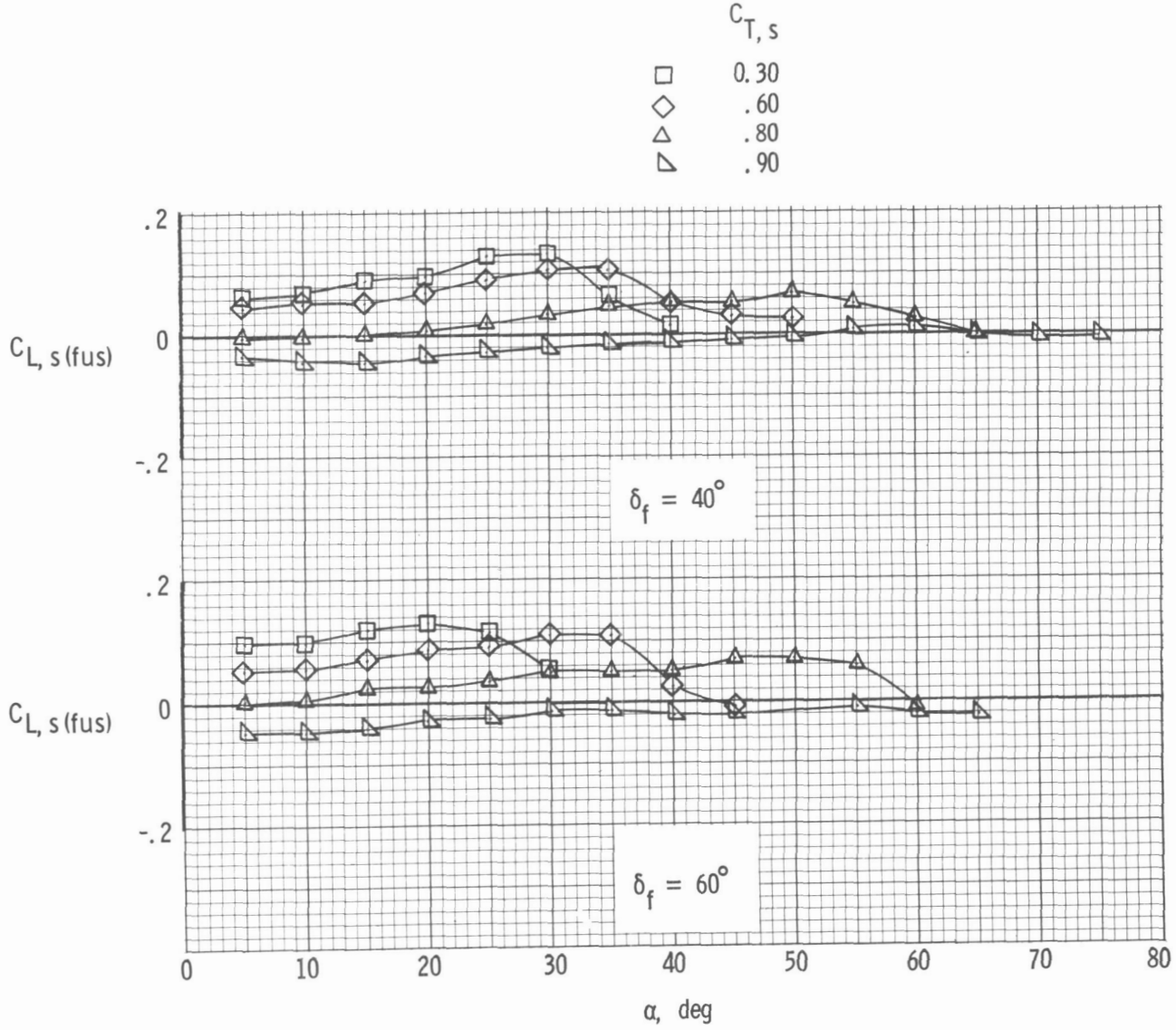


Figure 44.- Fuselage lift coefficient for down-at-the-tip rotation, basic leading edge, and fences on.

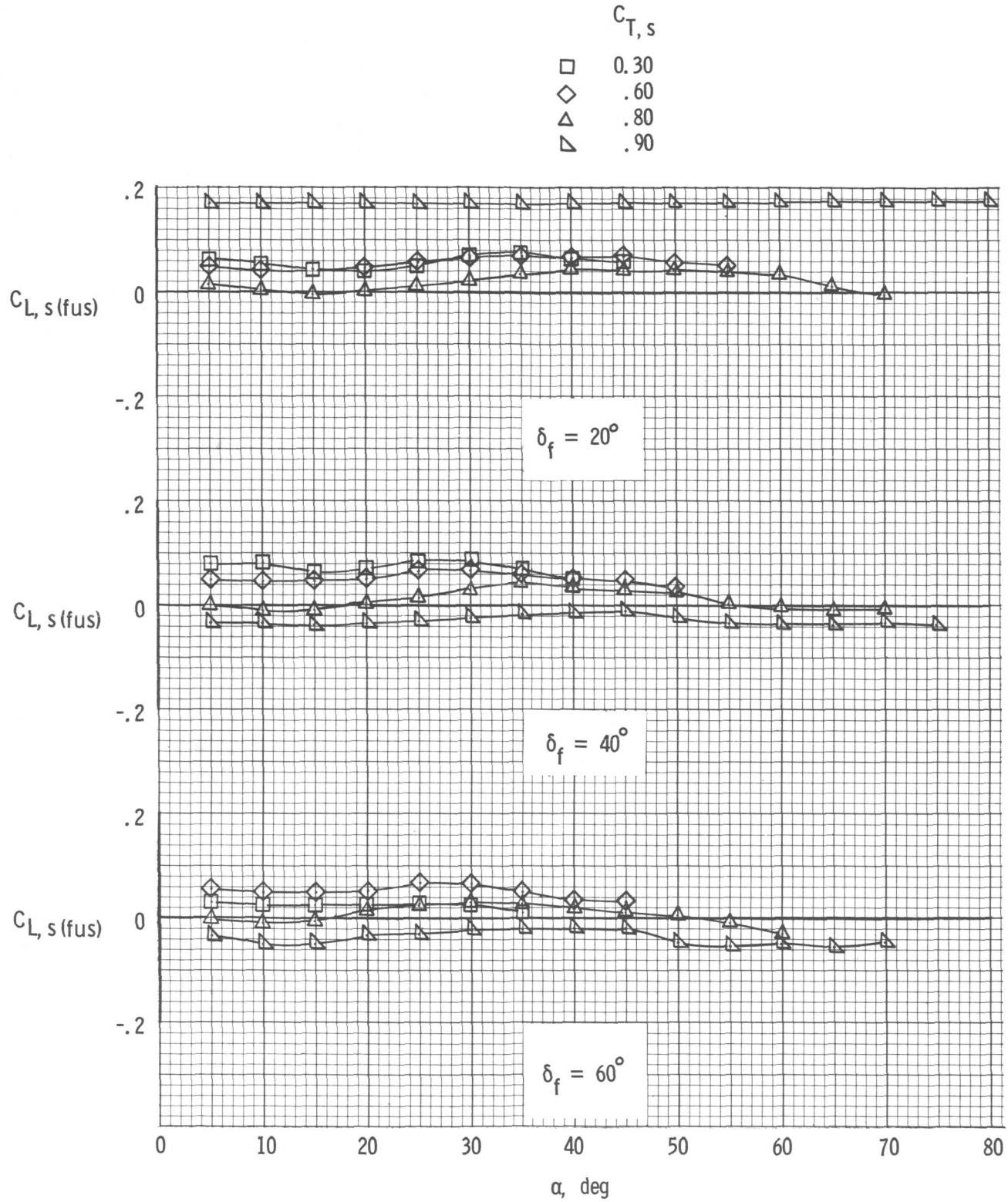


Figure 45.- Fuselage lift coefficient for down-at-the-tip rotation and inboard slat on.

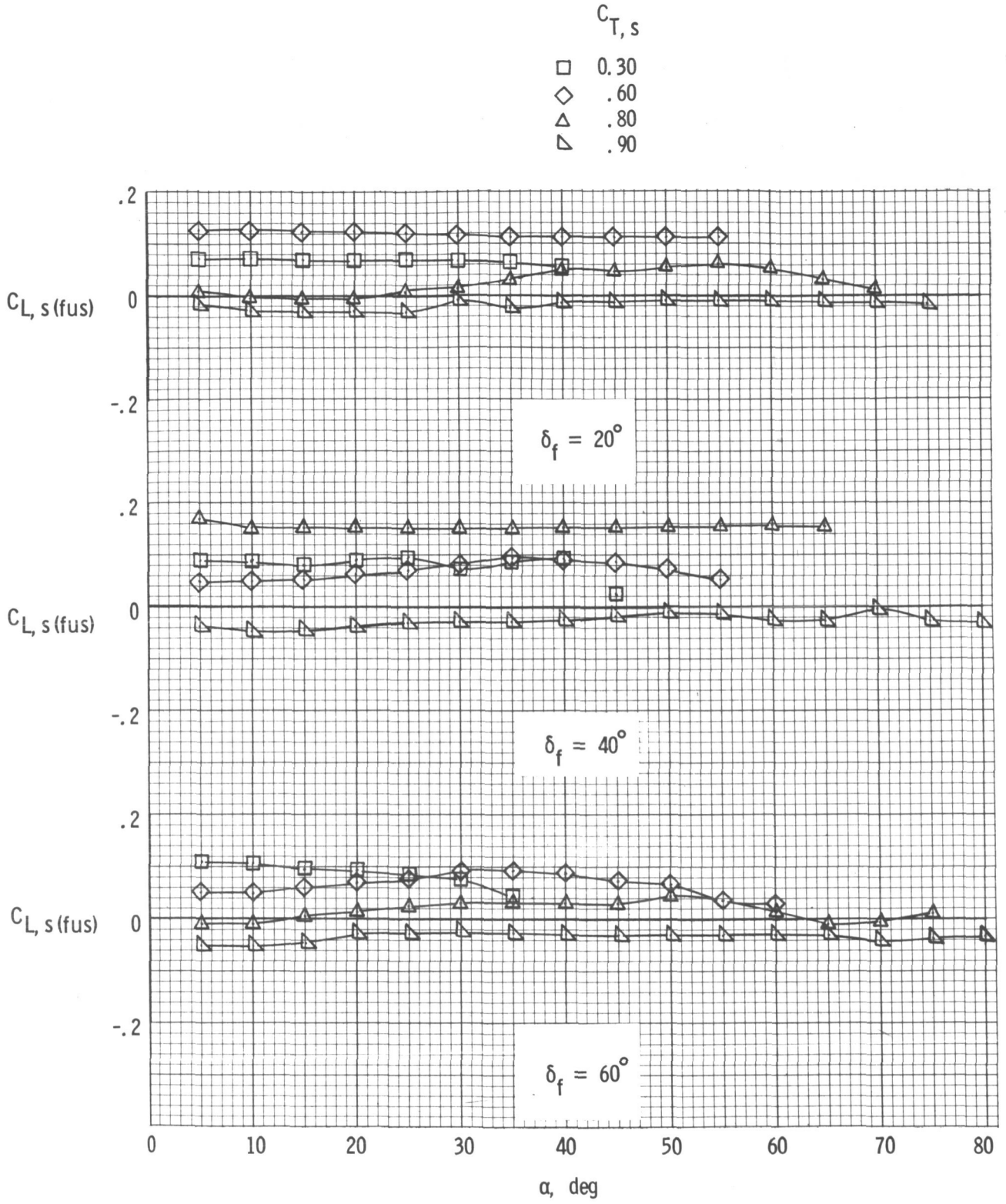


Figure 46.- Fuselage lift coefficient for down-at-the-tip rotation, inboard slat on, and fences on.

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—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

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